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A MODERN ACCOUNT OF PROBLEM SOLVING

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I. Introduction

Although the need for an adequate psychology of problem solving is generally recognized, progress in satisfying the need has been disappointing. One obstacle has been the lack of a suitable conceptual framework within which the experimental evidence can be advantageously arrayed. This paper is an attempt to identify the essential processes of problem solving, describing them in psychologically descriptive language rather than in the language of logic or of controversial points of view within psychology, and to organize the more important literature around these processes.

The topic is the reasonably well specified behavior which occurs when an individual—human or infra-human—engaged in active commerce with the environment meets an obstacle and his activity is impeded. One straightforward line of action is no longer apparent; the individual is faced with alternatives, must pause and choose. If no obvious alternative looks good, the individual may seek, or even construct, other alternatives, then choose among them. Of the many terms often used to differentiate such activity from routine or thoughtless activity "deliberation" is particularly convenient because it has no disturbing logical connotations—as "reasoning," e.g., has—, because its verb form is relatively unambiguous, and because it has an adjective form which may refer to persons as well as behavior.

Deliberation and learning. In conditioning experiments of the classic type, in most motor learning, and in rote learning deliberation does not ordinarily occur. Instrumental conditioning, as the term is used by Hilgard and Marquis (**59**), includes phenomena often listed under problem solving. Maier and Schnierla (**96**), among others, have objected to such usage. Mastery of complex or difficult material usually calls for deliberation in the early stages—in what Krechevsky (**79**) calls the "pre-solution period"—and for remembering in the later stages. The differentiation which Cox (**24**) makes between mechanical assembling and routine assembling is similar.

It is a fine question whether deliberation is one aspect or kind of learning—within learning broadly conceived—or a separate coordinate

process at the same level of analysis. Is it the same process when a rat is running a maze the first time and the thirtieth time? This paper is concerned with that phase of adjustment to a problematic situation in which solutions are found rather than the phase of increasing skill, or perfecting the execution of the solutions. It is obvious—and will not be repeatedly stressed—that the learning process influences mastery of all the materials of thought and the direction and efficiency of all the processes of thought.

Materials and processes. The differentiation between materials and processes, between static and dynamic concepts, which is implicit in much psychological discussion, must be made explicit. Materials, contents or objects of thought are such as perceptions, affects, concepts and complex patterns of these—anything which may be attended to, toward which behavior or thought may be directed. They are useful in analysis because they are the objects and the evidence of mental activity and the form in which the more subtle products of problem solving may be communicated.

The activities of problem solving are extremely diverse. But in the interests of economy certain regularities can be made out, certain kinds or classes of operations on the materials of deliberation. These particularly notable regularities are called processes in this paper. A similar differentiation between materials and processes is observed in physiology. Examples of materials are water, hemoglobin, tissues and salts. Examples of processes are solution, growth, coagulation and digestion. In modern psychology processes are differentiated and identified when they produce different kinds of behavior, when they are differentially affected by experimental conditions, when individual differences in their operation can be statistically differentiated, or when there is common agreement of a subjective nature.

Analysis of deliberation into three processes. On the basis of incomplete evidence, problem solving or deliberation may be separated—for the present review at least—into three processes, or groups of processes, which regularly occur during problem solving:

1. orienting to the problem,
2. producing relevant material, an elaborative function,
3. judging, a critical function.

These processes, and their interrelations during problem solving will be briefly described, then the more important literature will be arranged in reference to these processes.

The first of these, orientation, is a well known but not well understood process. Even quite simple organisms are capable of selecting from the environment certain aspects to be responded to. The complex problems of human concern require effective orientation to the prob-

lematic aspects of the situation, and reorientation as deliberation progresses.

"Producing relevant material" refers to a congeries of processes, since the materials of deliberation and the ways of manipulating them are variegated. The material may be produced by perceptual processes, as in the psychophysical judgment, or by affective processes. In many problems some of the material is produced from memory, as in the case of the rat at the choice point, or the student deliberating over the true-false item. Human beings elaborate various intermediary products, such as generalizations and patterns of action, to aid the search for relevant material.

The terminal phase of deliberation is the critical or evaluative phase, involving the selection of one or more of the alternatives elaborated by the foregoing processes. This selection or judgment asserts a relation between aspects of the problematic situation or the elaborated material which renders the situation less problematic (**28**, p. 283), thus releasing the orientation.

The solution of a simple problem is easily described in terms of these three functions. Consider the problem: "*This* is to *that* as *now* is to ——." One subject, as soon as his general orientation to the problem was established by the experimenter's instructions, noted that the problem was of a familiar type. Hardly any deliberation was necessary in selecting a plan of attack. He elaborated relations between *this* and *that*. He judged one of these relations, "opposition," as valuable, then placed *now* as one term of the relation, leaving a blank where the other term should be. With this schema in mind he elaborated words to fill the blank. When the word *then* appeared, he replaced his elaborative activity by critical activity and returned to his original orientation in order to check his solution.

Next, consider a more complex problem, making an equation out of the following: 2, 2, 2, 2, +, =. One usually attacks such a problem as a whole at first, raising the question: What is the best way to approach this problem? The material produced includes programs of action, memories of similar problems, hypotheses and the like. One of these plans is judged feasible. Thus the result of the initial deliberation is adoption of a plan; sophisticated subjects would call it a hypothesis. Let us suppose that the plan adopted is as follows: "I shall place the 'equals' sign in the middle and try various combinations on each side." This leads to the production of new combinations of numbers and signs. Several subjects working this problem judged many combinations unsuitable and were thus inclined to reject their program and search for a new one. The result of this deliberation was adoption of the plan of reexamining each number and sign for a "catch." In a few cases the concept of number was broadened to include exponents. With this additional material it was possible to take up the original plan and reach a solution.

Problem solving begins with the initial orientation and ends with the closing judgment, but between these bounds almost anything can happen, in any sequence. Manipulative aids, intended to facilitate solution of the major problem, may be minor problems in themselves. The

mind of man (and other primates), when baffled, is exceedingly flexible. Our account must not restrict its range or sequence of action unduly. Furthermore, if our account is to be broad and lifelike, it must include social problems and problems requiring creative thinking as well as those which have answers in the back of the book.

II. Orientation to the Problem

A. Conditions of Orientation

In this paper "orientation" refers to the process by which the organism grasps the material of thought and keeps it available for deliberation. In the lower forms bodily orientation seems to be an important part of the process. The higher forms, with much more cerebral tissue, enjoy more freedom.

Experiments on the delayed reaction in animals and children, such as those summarized by Munn (**106**), give some information on the conditions of orientation. In many experiments on human subjects the individual is oriented toward words or other symbolic representations of certain aspects of the environment. Having something "in mind" is a popular equivalent of "orienting toward" something when the objects of thought are absent or abstract. If a person is given some mixed-up wooden letters to arrange in the form of words, he will not occupy himself with geometrical patterns of the blocks or their color or texture. His activity will be related, more-or-less skillfully, to the meaning of the letter combinations. The orientation facilitates response to some stimuli and inhibits response to others, whether the oriented organism be a lower animal or a man occupied with a mechanical puzzle, or a man occupied with an ideational problem.

In a sense, orientation is the receiving function of mental activity. Responding activities, such as production of the material of thought and the search, will be considered later. The artificiality of the separation of receiving and responding functions of thought may be justifiable at the present stage of analysis.

When the solution is to be passed on to others—the usual case in human deliberation—the thinker's problem will include the defending of his ego or the persuasive phrasing of his solution as well as the on-the-record problem of finding the solution. Mead (**100**) and Piaget (**118**) have stressed these effects of social interaction on thought. Rignano (**123**) uses the term "dialectic reasoning." In other contexts it is called "rationalizing" although hardly any thinking takes place without some such considerations. The important point here is that such motives orient the thinker toward verbalizations, logical forms, and the likes and dislikes of his audience, things which he might neglect if he were isolated from social contact.

Initial orientation. Since the deliberation begins when the organ-

ism's activity is impeded, the initial orientation is in the direction of the interference. But a genuine problem implies a detour or, in other words, that the initial orientation is not adequate for solution. The initial orientation and succeeding orientations are dependent upon certain properties of the stimulus field, any one of which could be crucial in solving some problem. Considerable information is available on factors which affect orientation to visual stimuli, such as size, contrast, figure-ground relationships, interests and the like. Some of these, or their metaphorical equivalents, are useful in explaining orientation to ideational stimuli also.

Limitations of orientation. The mind of man is finite, and the amount of material to which one can orient is limited. One does not orient to the details of a movie until one's orientation to the seat is assured. The amount which one can orient to and remember long enough to report is called the "span of apprehension" or the "immediate memory span." Blankenship (11) reviewed the literature on span in 1938. It is only necessary here to point out that the conditions which affect the ability to perceive and report probably also affect the ability to perceive—or produce by some other process—and apply to the solution of a problem. The span has duration as well as extent, although experimental emphasis has been on extent as measured by number of items retained just long enough to be reported. It is an interesting question whether the inverse logarithmic relation between amount retained and time which seems to hold for long intervals will also hold for short intervals. Cook (23) used the disc transfer problem in which increasing the number of necessary moves changes the problem quantitatively but not qualitatively and found that difficulty, as measured by errors, etc., increased as a power of complexity, as measured by minimal number of moves.

Some evidence is available on conditions which disturb the orientation. Chrisof (20) has shown how, when the problem is difficult, people often give up the orientation to the problem in favor of daydreaming or some other substitute activity. Hildreth (58) points out the tendency of deficient children, working on a hard problem, to give up the original problem and look for some easier quasi-solution.

An important condition affecting orientation is called "distraction" in discussions of attention and "interference" in discussions of memory. Maier and Schnierla (95) have a section on attention and distraction in animal experiments. A recent experiment by Pillsbury and Sylvester (119) shows the effect of interference on immediate memory for tachistoscopically exposed material. From analogy with experiments on retroactive inhibition one would expect that similarity of material would increase the possibility of interference. Young and Supa (167) have demonstrated such an effect. They state:

The memory span for series containing two dissimilar types of material is

longer than the memory span for series containing all of one kind, hence providing empirical evidence that the limitation of the memory span is, at least in part, a function of internal mnemic inhibition.

In Hovey's (62) experiment, where the distracting material was not related to the material of the problem, the effect was negligible.

The importance of this similarity of material in causing interference will become clearer to anyone attempting to solve the following problem.

> The ages of a man and his wife are together 98. He is twice as old as she was when he was the age she is today. What are their ages?

When faced by such a problem one gets a feeling of confusion which can be interpreted as due to interference among the items of the problem, inhibiting effective orientation. Several methods are used in combating such interference. In solving the above problem writing down identities and relations in algebraic notation would reduce interference. Vocalization is another method which is often noticed in distraction experiments. The value of vocalization is in fixating the material more firmly—in temporary overlearning, one might say—and thus cutting down interference. On the reversed digit-span test most subjects vocalize the digits in forward order, so as to fixate the digits more firmly before attempting to reverse them. Any method of assembling the material into a pattern will facilitate grasp of the material. The amount of material which one can grasp and manipulate in deliberation is also influenced by one's mastery of the material. School children can work arithmetic problems better when the material is familiar than when it is strange, even though the numerical relations are the same.

The relation of physiological variables to capacity for orientation has not been thoroughly studied. For some interesting speculations on the neurology of attention and the initiation of thought—quite independent of psychological research—see Rosett (125). It is safe to say that whatever affects the general efficiency of the organism would affect capacity for orientation. Seward and Seward (132) found the effects of alcohol on immediate oral reproduction of syllogisms to be greater than on the syllogistic reasoning itself. It is plausible to suppose that the amount of material which one can grasp and report is closely related to the condition of the cerebral tissue. Changes in orientation seem to be accompanied by changes in muscle tension (38, Ch. 23), in Alpha rhythm (149, 159), in bodily movements (46) and in rate of winking (21).

B. Individual Differences and Development

Many of the tasks on intelligence tests require simple operations on simple material, a fact which suggests that the difficulty lies in main-

taining orientation to all the material while engaged in these operations. Counting backwards from 20 to 1, rearranging words in sentences, carrying out three commissions and following simple directions disclose individual differences in this function.

The digit-span test, which requires orientation to several items merely to reproduce them, is widely used and correlates reasonably well with intelligence test scores, according to evidence assembled by Blankenship (11). Data on the increase of span during the growth period are available in the texts on genetic psychology. Data gathered by Wechsler (153, p. 214) show the increase in span to age 20–24 and the subsequent decrease. The similarity between the age curves for brain weight and test scores, which Wechsler notes (pp. 59–61), would be more convincing in the case of digit span if raw scores rather than standard scores were used. Span is one mental test which can be scored in absolute units.

Some of the developmental studies have considered the temporal dimension of the span—called span of attention or of interest—as well as its breadth. In deliberation over involved problems the temporal dimension of the span may be the more important. Gutteridge (49) observed the duration of children's attention to various activities from age two to age six. The close relations between these two dimensions of span illustrate the necessity, in any broad view of thinking, for considering interests and preferences as well as abilities.

To anyone familiar with recent issues in the literature of individual differences, the question arises whether capacity for orientation is one ability or several. Will tests of ability to grasp different kinds of material correlate positively? If span of immediate memory be taken as a measure of capacity for orientation, the evidence is in general affirmative. In Blankenship's review some low and some quite high positive correlations are given. Brener (16) gave 17 tests of span, using words, numbers, phrases, and other material, presented in different modalities, and factored the correlations by Thurstone's centroid method. After rotation one factor accounted for most of the variance. Wittenborn (163) found a well-defined attention factor in an analysis of 20 tests. The best tests of this factor might be called complications of the digit-span test. They required sustained grasp of numbers and letters while carrying out simple irregular operations on them.

Had Brener and Wittenborn used more abstract material, of the kinds used in problem solving, it is unlikely that the results would have been different. Ability to orient to spatial patterns and reproduce them immediately appears to be a general thing, regardless of mode of presentation (22) or of mode of reproduction (143).

III. Production of Relevant Material

A. Materials of Thought

The materials manipulated in deliberation may be produced directly from the present situation, as by perceptual processes, or they may be remembered from the past (the learning process), or communicated from other people. Problems can be set up so that any of the processes is the principal determinant of the outcome.

Generalizations are important materials of thought, and the development of generalizations has been treated elsewhere, e.g., Hilgard and Marquis (**59**). But this process deserves brief mention here, because our interest goes beyond the development of generalizations to the use of such generalizations in deliberation.

The significance of generalization, in respect to deliberation, is that several objects of thought may be treated as one. When many particular apples are grouped under the concept "apple," orientation to these apples is facilitated and their manipulation in deliberation as well. Representing a generalization by a symbol, such as a word, facilitates communication of the generalization to others, and probably self-communication and manipulation in problem solving. In fact some writers assert that all thinking involves the use of symbols, although such a broad statement would rule out the solution of many mechanical puzzles.

Since generalizations are so important in thinking, it is obvious that errors of generalization, confusion of symbol and referent, and emotional involvement of the symbol are likely to cause errors in thinking. Some of the insights of the recent work on language, meaning and general semantics have been summarized from the point of view of educational psychology by Horn (**61**).

Although experimentation on such elusive subject matter as the concept is a triumph for psychology, an adequate understanding of problem solving will require knowledge of the development of even higher organizations of data, such as the concept of the self, points of view, frames of reference, and more complex patterns of interrelationships illustrated by the family pattern, the syllogism, and the pattern of industrial expansion. Of particular interest in the present discussion would be experimental evidence on the organization of patterns of the material of the problem and of imagined courses of action carried out in the problematic situation which yield the thinker some foresight of the consequences of such action. A complete psychology of problem solving would include a description of the attainment of mastery of such material.

The elaboration of any of these materials of thought may be a problem in itself, involving any of the thought processes discussed in this

paper or, once mastered, the material may be recollected as a unit. The products of today's generalization may be used automatically tomorrow in deliberation over new, more complex problems. Long and Welch (**88, 89, 154, 155**), in a series of studies of generalizing, have given special attention to children's hierarchical use of simple concepts to build more complex concepts at a higher level of abstraction.

B. Two Elaborative Processes

1. The Search. If the thinker can be assumed to have a variety of material or responses in his repertoire, the central question now becomes: How is the relevant material selected and manipulated so as to produce a solution? For the material produced is rather relevant. The behavior of most individuals—human or less—indicates that they do not sample the responses in their repertoires at random; their behavior shows some continuity and some point. The search is narrowed down to the likely places or ideas. This relevance of thinking has intrigued students of the higher mental processes for years, and a name, the "determining tendency," has been given to whatever it is that facilitates the production of suitable material and inhibits the production of the grossly unsuitable.

The present paper separates the activity which the determining tendency was intended to explain into two parts. The orienting function, described above, keeps certain stimuli or objects of thought available for deliberation, either in sight or in immediate memory. The responding side of deliberation can be treated as a search within the material in the perceptual environment or assembled in immediate memory or both, for a solution—followed often by evaluation of that solution. The solution sought may be a certain object or movement, a relation between objects or ideas, a reorganization of all material at hand, or some other way to make the situation less problematic.

The search may take many forms, depending upon the requirements of the problem, and various kinds of search have been exploited by various writers. Spearman (**134**) has studied the search for relations and correlates in many fields of creative endeavor. Maier (**91, 94**) is particularly interested in a synthetic search, "a combination of isolated experiences." Gestalt psychologists emphasize a search which results in a reorganization or recentering of the material. This is the crucial process in many problems, according to Wertheimer (**156**). Most generally, the activity of the higher vertebrates, including man, in a problematic situation can be characterized as a search for a way out. If the problem is complex, necessitating a detour, the individual's search varies. He alternates, perhaps, between a synthetic search and an analytic search, later reorganizing the whole thing to get his bearings before setting off on a search of a different sort.

The difference between search of a situation and immediate perception of the situation was noted by Hunt (**63**) in an introspective study of the observation of pictures and geometrical designs and by Freiberg (**39**) in a study of auditory stimuli near the threshold.

A number of concepts have appeared in the literature to account for the direction of the search and for the relevance of the material produced. This appears to be an open field for the development of new psychological concepts. Actually, however, the literature of this phase of thinking can be treated under two headings: the *search model* and *plans of action*.

The search model. An introduction to the literature on the search model or schema is given by Woodworth (**164**, p. 798 ff.). The next task is a description of the role of the search model in problem solving. The individual does not just search. Acceptance of an *Aufgabe* implies a search *for* something. The search model is a pattern of the requirements of the solution as these requirements are understood by the thinker. All the higher species are capable of acting selectively toward the more relevant aspects of a situation. Man is capable of mental manipulation of absent objects, i.e., of their representatives, and of manipulation of concepts and other abstract material in immediate memory. The search model is patterned from the relevant aspects of the situation and abstracted from the total situation, much of which is irrelevant and confusing. It is anticipatory in the sense that a pattern is abstracted with a gap to be filled.

The jigsaw puzzle gives a nice illustration of the use of the search model. Looking over the assembled pieces the puzzler builds up a pattern which partially outlines the necessary piece. With this pattern as a guide the puzzler searches among the spare pieces for one that will fit. It is important to note that he does not try to fit all the visible pieces into the pattern. Those pieces which are obviously unsuitable do not attract his attention, while the likely ones "jump out" at him.

The artist, the architect, the scientist and the poet, all are aided by search models of varying degrees of definiteness, which change, of course, as the search progresses. Spearman (**134**) gives many examples of artistic and scientific search illustrating the use of a schema made up of a fundament and a relation, the thinker to find the other fundament. Cox (**24**) uses Spearman's concepts in his analysis of mechanical assembling. In some perceptual problems the pattern of the search model need not be separately constructed, but is perceived directly. Gestalt psychologists have emphasized this phenomenon and have invoked the principle of "closure" in filling in the schema.

Faulty construction of the search model is, no doubt, responsible for errors in the search. "A question well put is half answered." Titchener (**148**) in 1924 attributed the overlooking of familiar objects to an

"unsuitable image." Kingsley (74) found that lack of agreement between the subject's idea of the object of search and the real object often retarded discovery. In a later study (75) he gave the subjects a small picture of the object sought and believes that this facilitated the search.

If the construction of the search model depends on such processes as generalization and pattern formation—as seems likely—knowledge of these processes is pertinent. The search model may contain more, or less, than the actual requirements of the solution. As in generalizing, the more striking specifications of the solution may be included, and the more subtle ones overlooked. Prejudices and values will enter in because the individual abstracts the search model from the situation *as he sees it*. Certainly in seeking a solution for social problems the social environment of the thinker is interiorized and represented in the search model. Illustrations of the effect of the *Zeitgeist* on the thinking of early psychologists are given in the last chapter of Boring's (14) recent history and in a recent review by Murphy (108). The history of philosophy and social theory gives many others. It is likely that there is more opportunity for error when the search model is constructed routinely, instead of deliberately.

The material of the search model need not be the same as the material of the problem. The solution of syllogistic problems is often aided by a visual schema. Rignano (123, p. 73) gives a good example of a visual pattern formed by lining up all the inhabitants of London side by side in order to verify the proposition that there must be two who have the same number of hairs on their heads. In a reasoning experiment with geometrical figures, however, Bowers (15) found that visual imagery was of no apparent value. Ruger (126) also minimized the aid of imagery in working three-dimensional problems. Verbal aids, on the other hand, are known to be definitely helpful in mechanical problems and mazes.

The material of the problem and relationships within the material are often put into verbal form, and from this verbalization the specifications of the solution may be verbalized. "I have to push the small ring off the pin without disturbing the string." Bentley (7) has stressed the importance of self-instruction in the search. In the protocols of the thought experiments are indications of a wide variety of devices used to get a purchase on the material of the problem. In many instances these devices are ways of assembling the material of deliberation so that the requirements of the solution may be visualized or otherwise formulated.

Plans of action. When the problem situation is so complex—together with the elaborated material—that the thinker cannot pattern the specifications of the solution to the whole problem into a usable search model and seek a solution directly, his initial attack is inadequate

and he must elaborate other plans of action. Nearly all thought experiments give evidence of analysis of the problem situation into smaller problems and of the elaboration of alternative techniques or plans of action when the first attempt has proved inadequate. A common technique is to search first for the cause of the difficulty, a procedure called "locus analysis" by Ruger (**126**) and "penetration" by Duncker (**31**) and Wertheimer (**156**). Durkin (**32**) gives other techniques. If the problem involves physical objects, the search is often aided by manual manipulation of the objects, random or planned. "Vicarious trial and error" could be considered a compromise between mental and muscular exploration.

Another common pattern of activity is to accept a solution tentatively while testing its consequences. The thinker may, even before seeking a solution, seek a way of putting the data into patterns which can be easily held in immediate memory and manipulated. For example, if the problem is one of evaluating a solution, it is relatively easy when the material is presented in a convenient pattern, but difficult when the material must first be rearranged (**18**).

These and other plans of action may be invented *ad hoc*, with the aid, perhaps, of a highly abstract search model, or they may be transferred from previous searches. Evidence for the mechanization of the plan of action has been given by Luchins (**90**). Many of his subjects learned a plan of action so thoroughly in a few trials that they followed it mechanically into failure even though simple solutions were obvious.

2. The "free" play of thought. The length of time thought is controlled or goal-directed, e.g., by a search model, is usually overestimated. Protocols are sprinkled with irrelevant comments and asides. If thought experiments dealt more often with social problems and problems requiring creative thinking, the overestimation would be corrected. Illustrations of the elaboration of material without deliberative control are suggested by the terms "trial and error" and "free association."

One result of the many experiments on "trial and error" *versus* "insight" is the general finding that, when the situation is beyond the organism's capacity for insight, i.e., when the organism is unable to pattern the specifications of the problem into a search model, activity will proceed in a more-or-less random way. Other likely reasons for reduction of control are the natural variability of the organism—since control requires a high degree of integration—and decrease in motivation.

It would be desirable to have more information on elaborative processes of the uncontrolled type. Pertinent information from the literature on association experiments, as summarized by Woodworth (**164**), is meager because the interest in association experiments, when they were done, was quite different from our present interest. What is needed is more information on association between plans of action, between

forms, and between words expressing relations, as well as between words like *chair* and *needle*. The importance of free association in problem solving can be seen more clearly by considering representative problems.

"Make as many words as you can out of *establishment*." Controls of the kind described above are not operative. If a man's eye lights on *ment*, will he think of *mental*, *mint*, *men*, or *cement*? If the problem is to design a fireplace for a certain house and the designer, in one of his less disciplined moments, is idly looking at pictures of old Norman fireplaces for inspiration, what principles govern his associations? Or suppose an adolescent is frustrated in his attempts to achieve social status in the conventional ways, which way will he turn next for a solution? Information on these principles may be of equal importance with information on controlled search.

Certainly "uncontrolled" thought is determined somehow. Psychoanalytic investigations have shown that affective factors and strivings influence the free play of thought. The phenomenon of "resistance" occurs regularly during psychoanalysis. The success of the projective techniques in personality study indicates that apparently uncontrolled perception is determined by deeper processes. Recent experiments show that hungry people are more likely to see food in ambiguous pictures than well-fed people (**87**, **127**). In a study of the words used in reporting responses to music—to which they were led by their previous studies of synesthetic thinking—Karwoski, Odbert and Osgood (**72**) found that the frame of reference was an important determiner of this rather "free" sort of thinking. Under the influence of various frames of reference the polarity *soft-loud* might be associated with *thin-thick*, *down-up* or *far-near*.

C. Creative Thought and Imagination

Such terms as "creative" and "reproductive" are relative terms, referring to position on a continuum. In the same sense that there is nothing new under the sun there is no response that exactly reproduces another. These terms are used to emphasize the relative presence or absence of novelty in the outcome of a search and as such are quite clearly used, though the judgments of the thinker and society may differ. The thinker has intimate knowledge of the processes of creation —at least he thinks he has—and bases his judgment of originality on such knowledge. Others lack this knowledge and must judge the product only.

One would suspect that controlled thought would be less likely to lead to creative accomplishment than the freer sort, but this may not be so. Novelty is included in the specifications for much creative thinking, particularly in the arts. In both artistic and scientific creation the search model may be explicit in regard to certain aspects of the solution

and permit, perhaps require, variation in others. The writing of a sonnet requires originality in content and adherence to tradition in form.

Two poems about morning collected by Mearns (**101**, p. 22) neatly illustrate explicit avoidance of the hackneyed by a high school girl. One stanza of the first poem, called B. C. (Before Cliché) follows.

> I watched a fluffy cloud drift by
> Across the boundless blue of sky
> And saw the sun's rays, molten gold,
> Upon the dewy earth unfold.

The next poem, called A. D. (After Discovering 'Em), is a revision of the first after the author had heard the word *cliché* and had discussed clichés in poetry.

> I saw the sun with battered face
> Trying to warm the human race;
> I watched a sodden cloud limp by
> Like some discouraged custard pie.

This brings the discussion to the very important topic of creative imagination. In the light of the present account of thinking creative imagination is not a different process from the others discussed herein, but a search which is free enough to yield a solution new to the searcher, yet controlled in such a way that the product will be cherished.

Unfortunately little evidence is available on conditions which foster or inhibit such a search. No doubt a wide range of experience facilitates imagination. Teachers of art and literature often emphasize this point. It is easy to find exceptions, too. Many good love lyrics have been written by inexperienced spinsters.

It is likely that some methods of teaching the arts foster imaginative self-expression more than others. Fox and Hopkins (**37**) have discussed this problem and have put forth some methods for teaching music creatively. Ralph Pearson (**117**) teaches painting by stressing creative design and imagination from the outset, rather than representation. Teachers who have used his methods report more imagination and freedom of expression in their students. It is possible that emphasizing representation at the beginning restricts the finding of anything non-representative in later searches.

Hutchinson (**65**) surveyed the materials for a study of creative thinking in 1931. Recently he (**67**) has discussed the period of frustration in creative endeavor and its relation to abnormalities. He has also described (**68**) the conditions and characteristics of creative insight from personal documents of artists and scientists. Markey (**97**) reviewed the literature on imagination in 1935. Some general texts in psychology, e.g., Stern (**136**), give good introductions to the problem, but empirical data on imagination as a psychological process, comparable to the data on learning or perception, are meager.

Winch (160) in 1910 reported some transfer between memorizing short stories and inventing new stories. Feingold (36) studied the effects of suggestions on the responses of five subjects to ink-blots. The responses did not follow the suggestions as often as expected. The suggestions cut down the number of responses, especially the more specific suggestions. Grippen (47) studied the artistic output of superior children with the aid of stenographic records, and found some of the sources of artistic conceptions—in travel, pictures and the immediate environment—and something of how these are elaborated, fused and composed. An approach to the problem of the motivation of imagination has been made through a study of the hypothesis that children conjure up imaginary companions because they feel a lack of more real companions (6, 64, 139). But the results are not conclusive.

These investigations have not gone far, but they—and the studies of individual differences to be mentioned later—indicate that the conditions of imaginative response can be investigated experimentally, as well as those of response which is right or wrong.

D. Temporal Relations in the Search

Several writers (20, 31, 141) have suggested general sequences or stages of thought. Cox (24, pp. 183–194) has described stages in solving certain mechanical problems. Heidbreder (56), however, found no uniformity in the discovery of rules. If the present account of problem solving is correct, no uniformity is to be expected, except in the minor ways to be described in the next few paragraphs.

Patrick (116) found that the creative search of her poets and artists usually went from general idea to specific detail. There were many exceptions. Sargent (128) found a similar sequence. Simple anagram problems were grasped as a whole and solved by "immediate reorganization." On the more difficult problems his subjects used the whole method first, then a piecemeal attack. One safe generalization is that "locus analysis" and any restructuring of the problem are followed by a new plan of action.

The solution of many problems can be described as a fluctuation between mental and muscular manipulation (24, 126). Heidbreder (56) found participant behavior four times as frequent as spectator behavior in the discovery of rules. Spectator behavior she describes as a kind of receptiveness to leads, often following failure, apparently due to lack of a hypothesis.

Designing a fireplace, an illustration of creative thinking previously mentioned, shows the alternation between controlled search and the freer sort of thinking. The designer might stumble on a happy idea for the face of the fireplace, after which his knowledge of the requirements of balance and practicality would control further search. Contrariwise, controlled thought might determine the general design of the fireplace and limit his fancy to decorative effects.

Robinson (**124**) found in the anagram problem that the length of time a subject followed a plan of attack varied with (1) the confidence felt in that plan and (2) the number of alternatives available. Heathers (**55**) has noticed that rats avoid repetition in a maze in which both alleys are rewarded. Goodfellow (**44**) reports similar tendencies to variation of response in the judgments of human beings.

Krechevsky (**77**) has some evidence that rats solve a discrimination problem by a systematic search, following for a while various leads, or at least orienting successively to different aspects of the situation. Whether such a procedure should be called a hypothesis is disputed (**135, 161, 162**). Witkin's (**161**) conclusion that there are more shifts in direction when the situation is complex agrees with Robinson's findings noted above. Long and Welch (**88**) find objective evidence for systematic search in children working a generalization problem. Lashley (**81**) has discussed these topics in some detail in respect to discrimination learning in the rat. Studies of the behavior of rats at a choice point (**25, 105**) indicate that deliberation is longest and "vicarious trial and error" most frequent just before errors start to decrease.

E. Availability of Material

The material in the thinker's repertoire prior to deliberation on any specific problem is an important factor in the effectiveness of the deliberation. Information from learning experiments, as suggested by the terms recency, frequency, reflex reserve and extinction, is pertinent.

But often material in the thinker's repertoire is not brought into immediate memory and made available for deliberation. It is likely that some sort of interference blocks the search frequently. Possibly the dual orientation to the search and to the original problem is too great a task. Some such interference can be noted in a common classroom demonstration.

Consider the problem: "Draw a quadrilateral of such shape that you can draw a straight line through all four sides." Students will usually draw quadrilaterals of rather conventional shape and thus cannot solve the problem. If told to neglect the problem temporarily and "draw the most peculiar quadrilateral you can," they will often be able to solve the problem.

It seems that starting the search in one direction blinds the thinker in some way to the possibilities of other directions. There is an analogy here to the influence of the "final common path" in neural integration. Ruger (**126**) noted that his subjects, working on three-dimensional problems, often made fatal assumptions of the nature of the problem or place of solution at first glance and were unable to change thereafter. The subjects in Luchins' (**90**) mechanization experiment on number and word problems showed a similar rigidity. Maier (**93**) was able to produce more solutions in an experimental group of subjects by instructing

them to guard against persistence of direction. His interpretation is that many failures are due to an actual inhibition of the variation of the search. Illusory partial success, as Cox (**24**, p. 180) noted in his investigation of mechanical assembling, may narrow the search prematurely.

If the material is embedded in one configuration it may not be available for use in another (**130**). This applies in perception, as the Gestalt psychologists have pointed out, also in generalization (**42**) and in the completion of jokes (**54**). Whether words are configurations in this sense is disputed (**27, 60, 111, 128**). Hanawalt (**50**) has recently shown how practice improves the ability to pick a simple design out of a more complex design in which it is embedded. Katona (**73**) has a section on availability and embeddedness.

There are ways of avoiding such limitations of variation in the search. Platt and Baker (**120**) found, by a questionnaire study of research chemists, that 60% would purposely give up a problem for a time in order to solve it. Success of thinking following an incubation period, which Patrick (**114, 115**) observed in the creative thought of poets and artists, suggests that the interferences may drop away during the period of abandonment. Hutchinson (**66, 67**) has emphasized this possibility also. One explanation is that the initial search model is inadequate and the search thus channeled in a fruitless direction. Abandoning the problem may promote the formation of a more adequate search model for the next attempt.

Probably frustration and emotion limit variation in human thinkers as they do in the rat (**35**). Ruger (**126**) stressed the importance of a confident "problem attitude" as opposed to "self-attentive" and "suggestible" attitudes. Heidbreder (**57**) found that adults were more objective about problems than children. Updegraff and Keister (**151**) observed that success on a few problems will increase a child's confidence in attacking other problems.

Extirpation studies (**78, 80, 92**) indicate that the intact animal can vary his responses, i.e., is less stereotyped, than those with brain lesions. Maier (**94**) has written a systematic discussion of the conditions of variability in problem solving.

The affective tone of the material will influence its availability in deliberation. It is no longer necessary to labor the point that most thinkers systematically repress and distort material which is unpleasant to them. Likewise, the utilization of material communicated from another person is influenced by the prestige of the other person, his delivery and other personal characteristics.

F. Individual Differences and Development

There is little evidence on individual differences in the processes discussed above, chiefly because thinking has not often been studied

analytically, in such a way that individual differences in the production of material for deliberation can be separated from individual differences in mastery of the material or in orientation. Until recently it seems that students of individual differences in intellectual function have been dominated by a schoolmaster's concern for the correctness of the response to the neglect of the processes by which the response is produced. What information there is should be organized, however, and the gaps pointed out.

Individual differences in formation of the search model are of significance. Cultural biases incorporated in the search model, for example, lead to individual differences in the solutions reached. The modern American farmer, looking for the cause of crop failure, will not find the same answer as the Dobu Islander. A Marxist's solution for unemployment will be different from that of an "economic royalist."

Individual differences in elaboration of plans of action are illustrated by Chant's (**19**) experiment. Among his subjects those with scientific training were more likely to use an analytic approach than the others. Hanfmann (**51**) has studied personal patterns in this sort of thing in a generalizing problem, using the Vigotski blocks. Some of her subjects used a conceptual approach, developing hypotheses from detached consideration of "what characteristics blocks have." Others used a more perceptual approach. She later reported (**52**) that women were more perceptual than men. Individual differences in the use of aids to the search, such as search models, hypotheses, verbal and visual aids, and techniques of resisting interference, no doubt contribute to individual differences in the outcome of the search. The habit of making such aids explicit may be a factor of considerable importance. R. H. Seashore (**131**) has discussed some of these factors under the name of "work methods." Sargent (**129**) likewise. Yacorzynski (**166**) reports a technique for investigating the "degree of effort" used in the solution of a problem. Recent analyses of individual differences in the maze learning of rats (**41, 150, 157**) disclose the explanatory value of factors such as these. In general it appears that the brighter rats make more use of the higher cognitive techniques.

There may be general preferences for some techniques of search rather than others. Some may prefer a creative to a reproductive search. Perhaps a "man of action" would show a higher ratio of muscular to mental manipulation.

If mental activity during problem solution does alternate between controlled search and free association, information on individual differences in association is pertinent. The literature on this subject, however, most of which is covered in Whipple (**158**) and Symonds (**140**), discloses little of value to this discussion. The kind of information which fits into this account is illustrated by Murphy's (**107**) 1917 study. He classi-

fied other-word associations of graduate students and faculty in various departments and found that those in the science departments were more likely to give opposites and coordinate responses than those in the literary departments. If this is a general difference between these groups in the free play of thought, it will affect their solutions of complex problems.

Individual differences in imagination and creative ability have been studied now and then, and some informal tests have been described. In tests of imagination the stimulus material, whether verbal or pictorial, is more or less unstructured serving—together with the instructions—chiefly as a standard starting place and starter for mental activity. The material may be entirely unstructured and ambiguous, as in the various ink-blots, and Miles' (**104**) Kinephantoscope, or merely incomplete, as in the many varieties of the completion test (**13, 102, 138, 147**) and tests of linguistic invention (**158**). Words may be imaginatively constructed also from ambiguous stimuli presented in auditory form (**33**) or in visual form (**133**). Boraas (**12**) gives other interesting informal tests of imaginative thinking. Quantitative scores are obtained from the amount or rate of production, and such scores have been taken as a measure of the fertility of imagination. The responses may also be qualitatively classified in order to disclose additional data on the thought processes or, as with the projective techniques, to illuminate the underlying personality structure. Such tests have not been widely used, and the customary data on reliability and validity are lacking.

Andrews (**4**) stimulated imagination in preschool children by showing them pictures and designs. She found it possible to get reliable ratings for quality of imagination on a scale running from "no imaginative play" to "personification" and "construction." Tendency to produce unusual responses correlated .87 with quality of imagination. Markey's (**98**) study of imagination in young children by analysis of diary records, observation during free play, and observation in controlled situations shows the correlation of imaginative response with MA and CA. She found that the child is likely to exhibit more imaginative behavior if he plays with older children, and that children of lower socio-economic status are more prosaic. Jersild and others (**69**) give percentages for the incidence of several kinds of fears, wishes, dreams, etc. in children of various levels of age and intelligence. Griffiths (**45**) used a clinical method which led her to stress the gradual development in imagination from a piecemeal indirect attack on a problem to a more socialized expression at the level of overt action and adaptive behavior.

Meier and his students (**30, 99, 102, 146, 147**), working with older groups, have described several tests of artistic ability and have used these in comparing the artistically superior and inferior. Meier (**103**) summarized these studies in 1939 and listed the factors in artistic apti-

tude. Lehmann and Ingerham (82, 83, 84, 85, 86) have reported considerable evidence on the ages of greatest creative output in several fields of endeavor.

Probably more information on the development of imagination will accrue as studies with the Rorschach and other projective devices continue. Klopfer and Kelley (76) in their book on the Rorschach have a chapter on intellectual aspects of personality. Amen (3) found that nursery school children's interpretation of ambiguous picture material "in terms of inner activity, thought or feeling, is a more mature pattern of interpretation than interpretation in terms of outward activity."

The question of a general "faculty" of imagination has been studied, and some positive evidence from intercorrelations has been reported (5, 53). Positive correlations of varying magnitudes have been reported for imagination and intelligence (4, 13, 98, 147). Correlations between imagination and other tests have also been reported (30, 146).

The relation between individual differences in the free play of thought and in controlled search has aroused some interest. To eliminate variation in mastery of the material and emphasize differences in the thought processes Johnson and Reynolds (71) set up a factor analysis of ten verbal tests involving various degrees of control of the response. Two independent factors emerged: flow of words and control of words. The first was best tested by the command: Write as many words as you can in three minutes. The second was tested by a vocabulary test. These are similar to, but perhaps not identical with, the two verbal factors, W for word fluency and V for verbal comprehension which Thurstone and Thurstone (144, 145) have found.*

IV. Problem-Solving Ability

The conventional organization of psychological knowledge—in the technical journals as in the textbooks—puts intelligence and intellectual abilities in a separate chapter, quite unrelated to the chapter on thinking. Since intelligence, however, is usually defined as capacity for adjustment—meaning adjustment to a problematic situation—there is no serious objection to equating general intelligence with the ability to solve the general run of human problems. Items on intelligence tests are mostly minor problems to be solved or tests of processes and materials used in solving problems, e.g., span and concepts. From this approach the most fruitful analysis of intellectual ability would be the identification and description of the various higher mental processes

* The third main process, judging the adequacy of the elaborated material, should logically be considered at this point. But the experiments on judgment have used other kinds of material, e.g., weights and sounds, hence the psychology of judgment contributes little at present to the understanding of problem solving. For this reason and because of space limitations the critical phase of deliberation will not be treated in this review.

and of individual differences in their operation (70). In accord with this approach individual differences in orienting, searching and imagining have been considered along with the descriptions of these processes.

As mastery of the technical details of the study of individual differences has increased, attempts have been made to study the more significant individual differences, i.e., those most directly related to the solution of man's problems. Many of these tests have been described by Glaser (43) and by Symonds (141). It is necessary here only to illustrate the kinds of tests being developed from this point of view.

Reasoning tests made up of logical exercises are well known. Arithmetic reasoning tests are common also. Recently tests of non-verbal reasoning have appeared and have been subjected to factor analysis (10). Some of the new tests stress self-criticism and avoidance of the irrelevant and prejudiced (40, 152, 165, 169). Tests of interpretation of data in special fields are available, e.g., in chemistry (110). Tests of scientific attitudes, interests and habits of thought have also been attempted (26, 112, 113, 142). Collections of common superstitions in the social studies as well as in science are available (121, 122), and can be used as tests. A few tests, including features of the foregoing tests, are called tests of scientific thinking (29, 168).

Validation of such tests is difficult. It is hard to say just what such tests measure because they have not been extensively used and analyzed. The central question is whether these new tests are testing more significant processes of thought than the older tests or merely mastery of different kinds of material. Certainly they should be compared with each other, with tests of reading and vocabulary, and with ordinary achievement tests on similar material. The question of superstitious thinking, for example, is not whether some people believe more superstitions than others, but whether there are habits of thought which make some people more likely to acquire such superstitions than others in the same culture.

Billings' (9) method is of interest in this connection. He raised the question whether there is a general problem-solving ability which operates on different kinds of material. Since mastering the material of the problem is considered a different process from problem solving, he endeavored to isolate problem-solving ability by giving his subjects instruction in the material of the problems beforehand. By this method he found a general factor of problem-solving in eight fields as diverse as arithmetic, physics and sociology. The average intercorrelation was .67, and Billings noted that the correlations between the problem solving tests and the subject-matter tests in the same field were lower than this. Such an approach is interesting and bears repetition.

Tests of the higher mental processes need not be limited to measurement of capacity, but may include measurement of the personality or

"style" of thought. The term "intelligence" could be broadened to refer to variations in habits and preferences as well as capacities—as implied in such older phrases as "a precise intelligence" and "a prosaic intelligence." Stoddard's (137) definition of intelligence includes such factors as resistance to emotion. Wechsler (153) included performance items in his battery of intelligence tests in order to bring out temperamental factors. There is good argument, of course, for restricting the term "intelligence" to the narrow meaning and using "mentality" for the broadened concept.

Recent factor analyses of personality inventories have resulted in factors such as "intellectual leadership," "intellectual independence" and a general preference for thought rather than action (17, 34, 48). Rorschach analysis, as by Klopfer and Kelley (76), leads to many statements about the style of thought, some of which are certainly deserving of attempts at validation.

It would be worthwhile to study the relation between individual differences in thinking and other personality variables. Kinds of reaction to frustration, for example, may depend upon intellectual factors as well as motivational and emotional. Biber and others (8) give detailed reports on the problem solving activities of a few children and the relation of these activities to the children's personalities as shown in other situations. On the basis of classroom observation Abel (1) has described several "modes of thinking" and their relation to classroom adjustment. Murphy and Likert (109) postulated a trait of "bookishness" to account for the greater liberalism of the more scholarly students. Such traits are worth taking seriously.

A test for the ability to adopt a new point of view could be constructed; Piaget (118, Ch. 3) has made a beginning. Stern (136, p. 312) speaks of four types of intelligence: reactive-spontaneous, objective-subjective, analytical-synthesizing and cognitive-practical. If there really are such types, or continua, it should be possible to devise tests for them. The problems involved in the construction and validation of a test of the style of thought—and the limitations of such a test—are practically the same as those of a personality test. And it is likely that some traits of thought are not "common traits" in Allport's (2) meaning of the term. Certain techniques of deliberation, for example, may be characteristic of an individual, but unique to him.

V. Concluding Statement

The tools of thought—in the terms of a common metaphor—are the search models, hypotheses, patterns of action and other devices for grasping, cutting out and manipulating the raw material. But the "stuff of thought" may be more than raw material; the craftsman may use concepts, frames of reference and biases which have been fabricated

previously, either by himself or others. The skilled craftsman uses his tools scrupulously, keeping them sharp and adjusting them to the task at hand.

The foregoing account of problem solving makes a differentiation between the materials of thought, which are extremely diverse, and the processes of thought, which are few. Intellectual abilities are treated as individual differences in the functioning of the processes of thought. Such an organization of the field permits a description of problem solving in general terms—in the broad way in which such an important topic should be treated—and furnishes a convenient plan for ordering the literature.

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A NOTE ON THE PROPOSED BY-LAWS FOR A RECONSTITUTED APA

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The recommendations of the Intersociety Constitutional Convention of Psychologists, including a proposed set of By-Laws, were recently published in the *Psychological Bulletin*.[1] It is proposed that a mail vote be taken this Spring and that final action be taken at the meetings of the societies involved in the Fall of 1944. Since war-time restrictions have made it necessary to hold a skeleton meeting during the past few years, and since it appears probable that a skeleton meeting will be held this year, psychologists will be asked to vote by mail upon important and fundamental changes in the constitution of the existing APA without ever having had the opportunity to discuss the necessity, desirability, and implications of the proposed changes in an open meeting of the members of the present organization. For this reason it seems highly desirable that the pages of the *Psychological Bulletin* should be made available for comments, criticisms, and free discussion of the proposed changes. And for the same reason, it appears to me highly desirable and of the utmost importance that no final action should be taken this year or any year until it is again possible to have free and public discussion at a meeting of the full membership of the APA. At the skeleton meeting held at Evanston, Ill, in September 1943, only 38 of the 760 Members of APA were present.[2] According to the By-Laws under which the APA now operates, this number does not constitute a legal quorum (Article II, section 4). That the final fate of an action as important as the one contemplated should be left in the hands of so few psychologists is highly undesirable.

The comments below are intended to call attention to the fact that the proposed By-Laws involve several fundamental changes in the existing APA in the hope that consideration of the implications of these changes may lead others to believe in the desirability of postponing action until public assemblage of psychologists is once more possible.

I. Comments on Article II of the proposed By-Laws. Membership

The present APA consists of three classes of persons: Members, Associates and Life Members. In the reconstituted APA all persons are

[1] *Psychol. Bull.*, 1943, 40, 621–647.

[2] Proceedings of the fifty-first annual meeting. *Psychol. Bull.*, 1943, 40, 650.

referred to as members; these are divided into three classes: Fellows, Associates, and Life Members. The Fellows of the reconstituted APA correspond to the Members of the present APA except that Fellows have fewer privileges than do the present Members. The Associates of the reconstituted APA are not at all comparable with the present Associates because the proposed Associates have all the privileges of the Fellows. Life Members of the present and proposed association are approximately the same. Some details concerning these differences or similarities are discussed below.

(a) *Fellows.* Fellows in the new APA would be approximately equivalent to the present Members except that their privileges and rights have been restricted. Both present Members and proposed Fellows are granted "all rights and privileges of the Association without restriction" (present By-Laws I, 2; suggested By-Laws II, 2). The structure of the reconstituted APA is such, however, that proposed Fellows actually have fewer privileges than present Members. The present Members are entitled to attend the annual business meeting, to discuss proposed actions, to vote on all actions, and may also introduce a motion from the floor if they so wish. In contrast with this, the Fellow of the proposed APA may attend certain meetings of the Council of Representatives but he does not have the privilege of discussion, of voting on proposed actions, or of initiating action as an individual member in the Association as a whole. The proposed Board of Directors is no longer elected by Members, i.e., Fellows, but is elected by the Council of Representatives and a Fellow has the privilege of voting for only his Divisional and Regional Representatives. (See below comments on the Council of Representatives.) Fellows of the proposed Association, then, actually have fewer privileges and rights than present Members.

(b) *Associates.* According to the proposed reconstituted APA: "Associates shall be entitled to all the rights and privileges of the association except those specifically denied them in these By-Laws" (Article II, 3). On examining the By-Laws it is discovered that *no* privileges are denied Associates. Voting for Divisional representatives, holding Divisional office, holding APA office, are all restricted to members but the class of member (Fellow, Associate, or Life) is not specified; thus the Associate member has all the privileges of the Fellow or the Life member. It is theoretically possible for the President of the APA or for a majority of the Council of Representatives to be Associates who are graduate students. Since the Council has full power over affairs of the Association, it is thus theoretically possible for graduate students to have control of the Association. I do not think that this is likely to happen but the fact that the By-Laws do not specifically prevent it seems to be a fundamental weakness. As the APA is now organized, full Members have certain privileges which Associate members do not have, specifically: voting, holding office and paying four dollars a year more dues than the Associate. In the proposed reconstituted APA the only "privilege" of the Fellow over the Associate is that of paying five dollars more dues each year.

(c) *Life Members.* Life Members are approximately the same in the present and proposed By-Laws except that, in the proposed scheme, either an Associate or a Fellow may become a Life Member while in the present organization only a Member may become a Life Member.

II. Comments on Article IV: Council of Representatives

The APA has been a strong centrally organized society. It is the largest Psychological Association and I believe its dominance should be recognized in the reconstituted society. The By-Laws of the proposed reconstituted APA are written so as to greatly weaken the society as a whole and to give proportionately great power to Divisions which represent special interest groups. The proposed By-Laws are so written as to give unusual power in the control of the affairs of the Association as a whole to these special interest groups, particularly to minority groups. The legislative powers of the proposed APA are given to the Council of Representatives, rather than to the Members as at present. The Council of Representatives is thus an extremely important and powerful body in the reconstituted society. It is important to consider, then, how well this body will serve the interests and needs of the Association as a whole.

Every Division is entitled to at least two Representatives, the Division Chairman and Secretary. Additional Representatives may be elected by the Division depending upon the number of members of the Division who are also Associates and Fellows of the Association. But a large Division can not elect a duly proportional greater number of Representatives. For example, a Division of only 50 members would have two Representatives on the Council (the Chairman and Secretary of the Division), while a large Division having 1200 members would be entitled to a total of only six Representatives (including the Chairman and Secretary of the Division). Thus, in this hypothetical example, a Division with twenty-four times the number of members has but three times the number of Representatives. The relative power of the small Division in legislative matters affecting the Association as a whole is quite disproportionate to the number of psychologists belonging to that Division. Minority groups are thus given relatively great power in the Association.

Not only does the proposed constitution give unusual power to minority groups, but it also enables a member to vote for Representatives of every Division of which he is a member. The combination of these two conditions would make it possible for a small number of aggressive persons to gain almost complete control over the Association. That is, the APA can become subjected to a type of political manipulation which will put the control of the association in the hands of a relatively small number of individuals. How is this possible?

Suppose that a group of about 240 people wished to gain considerable influence on the Council of Representatives to forward some program or policy beneficial to themselves but not necessarily beneficial to the Association as a whole. They could best carry out their program by electing as many members to the Council of Representatives as possible. This could be done by first forming a separate Division for themselves which would entitle them to three Representatives (Chairman, Secretary and one additional). Then, by joining a number of small Divisions and voting as a bloc, they could almost certainly elect one or more representatives favorable to their program in each of these

Divisions. The total number of Representatives which might be elected by a vigorous and aggressive minority of 240 individuals would thus seem to be limited only by the number of divisions existing and the willingness of these individuals to pay whatever Division fees may be involved.

Such a state of affairs probably would not occur, but the possibility that it could occur under the new By-Laws is a fundamental weakness.

Possible restrictive effect on interest and research. Under the present APA organization, a Member or Associate is privileged to submit a paper upon any topic that he may wish. In the suggested organization, programs of papers are to be arranged by the Division Program Committees (subject to coordination by the Convention Program Committee). Since the right is not specifically denied in the By-Laws, a Division could well make membership in that division a requirement for the submission of a paper to that Division's program.

Thus a child psychologist, for example, who has tested one of his theories on rats and might wish to read his paper on the program of Animal Behavior, could be required to join the Division of Animal Behavior and pay whatever dues are involved in order that he could read his paper. The ultimate effect of such action would be to restrict research interests and to discourage a psychologist from doing research in fields other than his Division or Divisions. Such restriction may not occur in practice, but the possibility that it could occur would indicate another weakness in the By-Laws.

III. Other Comments

There are many other questions about the proposed By-Laws which might be raised. Is an organization of between 3500 and 4000 members large enough to justify such an elaborate Divisional and Representative system? Is the organization large enough to support the proposed budget of $40,000.00 per year? For what purpose will the increased funds be spent? If reconstituted, should the organization start immediately with the proposed nineteen Divisions, or should it start with one General Division only, allowing other Divisions to form according to the procedures outlined in the proposed By-Laws? Is it desirable to give to groups which are not primarily psychological nor composed primarily of psychologists, special representation (Article IV, 10) on the legislative Council of a Psychological Association? There is not sufficient space for discussion of these and many other questions: the points which have been discussed above were selected because they seem to point most clearly to the necessity of careful consideration and to the undesirability of hasty action.

IV. Conclusion

Fundamentally, the present APA is a strong organization and it has well served the interests of the majority of its members. So far, I have not seen arguments or discussions which indicate that such a thor-

ough revision of the organization as that suggested is either essential or desirable. Some modifications in the existing structure to meet the needs of special groups may be desirable and could be set up, but I believe that the APA should be the mainstay of any modified organization and that the Divisions or special groups should have only those powers which are specifically delegated or granted to them by the membership as a whole. The suggested By-Laws turn this around and make the Divisions primary, giving them all powers not specifically denied in the By-Laws. I do not believe that the interests of psychology and psychologists, as a whole, will best be served by the suggested reorganization. Some special interest groups may benefit, but it is a question as to whether the reorganization will unify psychology or disintegrate it. The suggested change in organization appears to be too fundamental to be made without considerable discussion by psychologists. Since it is no longer possible for any great number of psychologists to meet at conventions and express their views, it would seem most desirable that action on the proposed changes be postponed until such a time as public discussion is again possible.

A NOTE ON THE MEETING OF THE JOINT CONSTITUTIONAL COMMITTEE OF THE APA AND AAAP

FEBRUARY 26 and 27, 1944.

JOHN E. ANDERSON

The Joint Constitutional Committee of the APA and the AAAP met at Ohio State University in Columbus on February 26 and 27, 1944, to consider the results of the Survey of Opinion on the divisional organization of the reconstituted APA, together with such suggestions for the modification of the By-Laws as were submitted. Present were E. R. Hilgard, *Chairman*, J. E. Anderson, Alice I. Bryan, S. L. Pressey, and W. L. Valentine. The committee had available some 3,500 replies to some 6,000 blanks which had been mailed to psychologists. Of these replies, 3,210 had been tabulated.

The committee agreed upon the following charter divisions for the reconstituted APA, which, without the explanatory statements, will appear in Article VII, Section 12 of the By-Laws as revised by the Joint Committee. (Article III, Section 11, of the By-Laws as printed*).

1. *Division of General Psychology*
   To include those who do not express a preference for another division.
2. *Division on the Teaching of Psychology*
   To include those who are primarily teachers and have as a basic professional interest a desire to improve teaching materials, methods, and procedures.
3. *Division of Theoretical-Experimental Psychology*
   To include those whose scientific research interests are related to the systematic, theoretical and methodological problems of psychology.
4. *The Psychometric Society—A Division of the APA.*
   To include the present members of the society and others who are interested and who meet the requirements of the society.
5. *Division on Evaluation and Measurement*
   To include those concerned with practical problems of evaluation, appraisal, and measurement.
6. *Division of Physiological and Comparative Psychology*
   To include those interested in the methods and results of physiological and comparative investigations.
7. *Division of Childhood and Adolescence*
   To include those interested in the field of human development.
8. *Division of Personality and Social Psychology*
   To include those with theoretical and systematic interests in personality and social behavior.
9. *Society for the Psychological Study of Social Issues—A Division of the APA.*
   To include present members of the society and others who are interested and who meet the requirements of the society.
10. *Division on Esthetics*
    To include those whose interests are primarily in the psychology of music, art, literature, and drama.

* By-Laws Appropriate for a Reconstituted APA. *Psychol. Bull.*, 1943, 40, 626–645.

11. *Division of Abnormal Psychology and Psychotherapy*
To include those interested in deviations from the normal and in treatment.
12. *Division of Clinical Psychology*
To include the present members of the clinical section of the AAAP, and others who are interested and who meet the requirements of the section.
13. *Division of Consulting Psychology*
To include the present members of the consulting section of the AAAP and others who are interested and who meet the requirements of the section.
14. *Division of Industrial and Business Psychology*
To include the present members of the business and industrial section of the AAAP and others who are interested and who meet section requirements.
15. *Division of Educational Psychology*
To include the present members of the educational section of the AAAP and others who are interested and who meet the requirements of the section.
16. *Division of School Psychologists*
To include practicing psychologists attached to a school or school system.
17. *Division of Personnel and Guidance Psychologists*
To include those whose primary interests are in selection, training, and guidance in schools, colleges, and guidance agencies.
18. *Division of Psychologists in Public Service*
To include psychologists employed in local, state, and federal governments.
19. *Division of Military Psychology*
To include the present members of the military section of the AAAP and others who are interested and who meet the requirements of the section.

As a result of the criticisms and suggestions sent in, some contradictions, duplications, lacks of parallelism, and other editorial defects in the By-Laws were met by rewriting, reorganization and renumbering without, however, essential changes in meaning. Detailed consideration was given the Board of Affiliates to which official objection had come from the Board of Governors of the AAAP, the New York State Association of Applied Psychology, and many individuals. Although the Board was eliminated, the principle of affiliation was retained. The responsibilities of the Executive Secretary and of the Central Office were clarified. The Article on Publications was rewritten, with a change from an Advisory Board to a Committee on Publications. The entire committee and board structure was examined in order to make more uniform the methods of selection, terms of office, and statements of responsibilities. The rewritten enabling article now includes a mechanism for putting the By-Laws into effect if adopted. It sets up a joint committee on reorganization to function during the transitional year, while the old societies continue as before.

The revised By-Laws, together with blanks for the advisory mail vote on their acceptance or rejection, and blanks for final divisional choices, will be distributed through society offices to the members of the psychological associations. The results of these ballots will be presented at the 1944 society meetings for such official action as the societies may wish to take.

PSYCHOLOGY AND THE WAR

Edited by

DONALD G. MARQUIS

CONTENTS

ORGANIZATION AND RESEARCH ACTIVITIES PSYCHOLOGICAL RESEARCH UNIT NO. 3 ARMY AIR FORCES

STAFF, PSYCHOLOGICAL RESEARCH UNIT NO. 3
*Santa Ana Army Air Base, Santa Ana, California**

This article is the third in a series describing the Aviation Psychology Program of the Army Air Forces. The first article in the series (2) presents a general outline of this program. The second article (3) deals with research activities at Psychological Research Unit No. 1, Nashville, Tennessee, and describes some of the operations involved in processing Aviation Students. The present report treats the history, organization, and research activities of Psychological Research Unit (PRU) No. 3, Santa Ana Army Air Base, Santa Ana, California.

I. FUNCTIONS, HISTORY, AND PERSONNEL

The principal functions of PRU No. 3 are as follows:

(1) the administration of a prescribed battery of classification tests to candidates for aviation training for the purpose of providing aptitude ratings and

* This article is based on the annual report for the Fiscal Year of 1943, prepared by the staff of Psychological Research Unit No. 3 and covers the period from the beginning of the unit to 30 June 1943. The materials were abstracted and edited in the Psychological Branch, Research Division, Office of the Air Surgeon, Headquarters, Army Air Forces.

recommendations concerning the aircrew classification of these individuals;

(2) the development of tests of intellectual functions and educational achievement; and

(3) the development of techniques and completion of special research projects for the Army Air Forces Western Flying Training Command.

The beginning of the unit dates from the appointment and assignment of Major (now Lt. Colonel) J. P. Guilford as Director on 3 March 1942. As of 30 June 1943, the personnel of the unit consisted of 19 officers and 102 enlisted men. All of the officers are graduates of accredited colleges or universities with either an undergraduate major in psychology or graduate work in this field. Approximately 75 percent hold advanced degrees in psychology. The majority of the enlisted men have a Bachelor's Degree with a major in the field of psychology, and approximately 20 percent hold advanced degrees. A roster of the names of the officers and enlisted men who have been on duty in the Aviation Psychology Program at PRU No. 3, prior to 30 June 1943 follows.

Officers who have been Assigned to Psychological Research Unit No. 3

Alchian, Armen A.	Johnson, Albert P.	Perrish, Albert
Brick, Jay R.	Kemp, Edward H.	Roff, Merrill F.
Brown, Clarence W.	Killian, Frank, Jr.	Russell, Roger W.
Cook, Stuart W.	King, Joseph E., Jr.	Stein, Seymour P.
Crannell, Clarke W.	King, Wilbur R.	Stevens, William C.
Grings, William W.	Long, William F.	Walton, William E.
Guilford, Joy P.	Lucio,William H.	Warren, Neil D.
Humphreys, Lloyd G.	Murphy, Robert E.	

Enlisted Men who have been Assigned to Psychological Research Unit No. 3

Austin, Donald W.	Carlstrand, Robert W.	Ehmann, Gerhard E.
Allenstein, Morton B.	Carpenter, Lewis G.	Eisenberg, Ralph M.
Anderson, Clifford L.	Carver, William T.	Elkin, Albert
Ax, Albert F.	Cass, William A., Jr.,	Emeson, Walter A.
Ball, Fred J.	Cerf, Arthur Z.,	Etkin, Jacob G.
Barenholtz, Joseph	Christensen, Arden H.	Fake, Clyde F.
Bath, John A.	Cole, Joseph C.	Ferguson, James B.
Bean, Walter W.	Coman, Edward F.	Finston, Arthur H.
Beck, John B.	Coulson, Leo C. V.	Foster, Lester I.
Berne, Allan L.	Cowan, Warren J.	Fotos, George
Bessent, Trent E.	Crandell, Richard P.	Frank, Harry M.
Bitzer, John A.	Crumbaugh, James C.	Fruchter, Benjamin
Bornemeier, Russell W.	Davis, Paul C.	Gallagher, Thomas P.
Braden, Joseph D.	Deigh, Maurice	Garrett, William H.
Brent, Allen R.	Dexter, Richard O.	Glass, Julius
Brill, Robert S.	Diamond, Nathan M.	Goettel, Philip O.
Brock, Robert L.	Dice, Robert F.	Goodman, Alan C.
Brown, Gilbert C.	Dietsch, Robert W.	Goodwin, Philip A.
Bullock, Harrison	Druitt, William F.	Graham, Asbury M.
Burdman, Milton	Dudek, Frank J.	Graves, Mentor E.
Butler, John M.	Duncan, Raymond E.	Green, Lewis P.

Greenberg, Alexander
Hahn, Dale D.
Hales, Howard J.
Harsh, Joseph R.
Harter, Aubrey B.
Heller, Hyman
Hoban, Albert E.
Holmberg, David M. L.
Holmes, William W.
Hooper, Herbert E.
Howe, John W., Jr.
Hutchinson, Linn
Jensen, Alfred C.
Jerrells, Herbert E.
Jolley, Calvin B.
Kana, George
Katz, Barney
King, William C.
Kitterman, Robert R.
Knippel, William R.
Kounin, Jacob S.
Kravetz, Nathan
Krise, Edward M.
Lacke, Joseph P.
Lake, Richard A.
Lambert, Robert E.
Lamkin, Hibbard
LaVine, Harvey B.
Martin, Glenn C.
Mason, George E.
McClelland, William A.
McGrath, William
McCarthy, Harold E.
McPeek, George A., Jr.
Meiners, Eugene E.
Mendell, Ira A.
Mock Sanford J.
Mount, George E.
Michel, Norman Ellwood
Most, Milton L.
Munter, William H.
Myers, John L., Jr.
Neece, Robert W.
Newman, Emanuel H.
Neuman, Gerard G.
Oveross, Mardon J.
Owen, Frank E.
Owens, Forrest A.
Pearlstein, Leo
Peters, Donald B.
Pickman, Milton E.
Pierson, Robert M.
Porter, Robert B.
Potter, Eugene J.
Potter, Homer H.
Pruiett, Ralph E.
Rand, Morris J.
Ray, Esten W.
Richardson, Carroll H.
Richtig, Valentine L.
Riopelle, Arthur J.
Robinson, James O.
Rogosin, Hyman
Rokeach, Milton
Rose, Nicholas
Rose, Glenn Ivan
Rosenberg, Harry
Roth, Harold I.
Russell, Robert L.
Saxe, Carl H.
Scherer, Wallace B.
Schureman, Robert Y.
Shirley, Gerald H.
Shneidman, Edwin S.
Skahen, John R.
Slawson, Robert M.
Smith, Gerald F.
Smith, Harley B.
Smith, Mahlon B.
Smith, Robert M.
Smith, Thomas W.
Spelta, Victor F.
Sprecher, Harris A.
Stone, Leon N.
Summers, Oliver H.
Tarwater, Jesse W.
Utter, Robert F.
Vedder, Palmer W.
Verhusen, Ben L.
Vinson, David B.
Vinter, Robert D., Jr.
Vrettos, Nick N., Jr.
Wald, Malvin D.
Waldman, Marvin
Webb, John A.
Wheeler, William M.
Whittier, William C.
Weksler, Harold
Wiley, Charles W.
Wiley, Llewellyn N.
Willcox, Henry H., Jr.
Williamson, Dale C.
Wilson, Dale K.
Winkler, Rudolf
Worthington, Netter R.
Wolff, Joseph F.

II. Organization and Procedures

The Unit is divided into five principal departments: (1) Administration and Supply, (2) Psychomotor Testing, (3) Coordinating, (4) Interviews, (5) Researeh and Test Construction. The division of these departments into sections may be described as follows. The Department of Administration and Supply includes the Director's office, the Adjutant's Office, and Supply. Under the Psychomotor Testing Department come the Test Administration Section, the Test Maintenance Section, and the Records and Statistics Section. The Coordinating Department covers the Scheduling Section, Group Testing Section, Scoring and Aggregate Weighting Section, Recording Section, Recommendations Section, and Records Section. The Department of Interviews

includes the Interviewing Section, the Surgeon's Board Section, and the Analysis of Interview Reports and Evaluation Section. The Research and Test Construction Department includes Test Development, Statistics, and special Projects.

The procedures for processing candidates are the same at all Psychological Units. These have been presented in detail in the previous article, but may be described briefly here.

Each candidate for aviation training takes an initial screening test, the Aviation Cadet Qualifying Examination. If successful, he is tested later with the Psychological Classification Battery. This battery consists of 20 tests including a number of pencil and paper tests administered on the first day of testing, and several apparatus or psychomotor tests taken on the second testing day. Experimental tests may be administered following the appropriate classification tests. Recommendations for training as pilot, bombardier, navigator, or ground crew are made on the basis of aptitude scores, expressed preferences, and experience.

Among the data considered when recommendations for classification are decided, the candidates own statement of preferences has received much attention. Each candidate fills out a blank which provides opportunity for rating interest in the potential field of pilot, bombardier, navigator, and ground training on nine-point scales. In addition to a statement of preference for type of training, each candidate indicates on a form a preference waiver which consists of a statement of willingness to waive his preferences in the light of results on the psychological classification tests. These waivers are of four types ranging from "I want to be assigned to the type of aircrew training for which I show the greatest ability on the tests" to "I want to be assigned to the kind of aircrew training in which I am most interested *even* if the tests show that I would probably fail in that type of training." In addition to the aptitude scores, statements of preferences and preference waivers are taken into account in recommending each candidate for training.

In addition to obtaining a statement of preferences and preference waivers from each candidate, a number of applicants are interviewed. Several objectives have been foremost in connection with these interviews. These include the clarification of preference; the clarification of cases in which preference or aptitude scores are tied; the notification of candidates who are not qualified for the type of training they prefer; and the evaluation of motivation of those who state a high preference for some duty other than aircrew.

III. Research

In addition to the test construction and validation described in the following paragraphs, the personnel of PRU No. 3 have performed several job analyses, including one of the bombardier and one of the aerial gunner, and a number of statistical and normative studies. PRU No. 3 has also undertaken several special projects and contributed personnel to research detachments. A special contribution has been the procurement of early validation data. In many instances tests were given to classes in pre-flight school and reports were obtained directly from the flying schools. By means of criterion data obtained at the earliest possi-

ble date, it has been possible for PRU No. 3 to check the predictive value of various experimental tests several months sooner than was achieved for tests which were validated routinely at Headquarters, AAF Training Command.

The original assignment of research responsibility at PRU No. 3 was the area of intelligence, judgment, and scholastic or educational achievement. The following list of sub-areas, modified somewhat on the basis of early research findings, may be taken as defining the research field of PRU No. 3. Work on research problems in this area began soon after the unit was organized in March 1942. On the basis of an analysis of success and failure in flying training, a breakdown of this general area into a number of sub-areas had been made. These sub-areas are as follows: (1) information, (2) reasoning, (3) judgment, (4) foresight and planning, (5) memory, (6) reading comprehension, (7) mathematics, (8) physics, and (9) mechanics.

In seeking valid tests in the assigned area, several general working principles have been invoked by PRU No. 3. First, it has been the conviction that a systematic exploration and coverage of the sub-areas would prove more fruitful in the long run than the response to a series of isolated hunches, however brilliant. Secondly, the importance of obtaining and considering early validation data was stressed. Next, believing in the value of factor theory as a working hypothesis, factorial methods were employed in order to (1) test the provisional categories of the assigned areas; (2) discover the significant variables measured by tests devised in the sub-areas so that these variables could be capitalized; and (3) determine which tests in a given sub-area were most worth validating.

Specific hypotheses, working principles, and operational definitions of the sub-areas stated above are presented in the following discussions. Where systematic coverage of the sub-areas has been accomplished and data are available and can be released without violating security principles, specific description of tests and summaries of results are reported.

1. *Information.* The information area includes all areas of knowledge which might be expected to be predictive of success in pilot, bombardier, or navigator training, except mathematics and physics, which have been given independent status. Two specific fields are believed to be of major importance. One is the knowledge of aviation, flying, current aviation affairs, etc. The other area of primary importance is mechanical information. It was assumed that cadets with an experiential background of familiarity with machines, tools, automobiles, and automobile mechanics, etc., would have an advantage in aircrew training. The belief that these two specific fields would be of significance has been substantiated by the comparison of test results with success or failure in aircrew training. A test of information in several fields is included in the present classification battery.

2. *Judgment.* A considerable amount of research effort has been devoted to the development of judgment tests and judgment items both at PRU No. 3 and

in other units of the Aviation Psychology Program. A large proportion of this effort has been devoted to the development of items for the judgment section of the Aviation Cadet Qualifying Examination. On the basis of factor analyses of judgment tests, PRU No. 3 has suggested that, in the aviation context, judgment may not be a significant concept and can be broken down into more specific factors.

3. *Physics.* Several tests of physics have been developed which sample the terminology and general principles of physics with the exception of the fields of optics and acoustics. These tests appeared to be loaded primarily on the verbal-intellectual factor and, as in other tests heavily loaded with this factor, yielded validity coefficients ranging from zero to .15 for several samples of pilot cadets. No test in this area is employed in the classification battery.

4. *Reading Comprehension.* Several tests of reading comprehension have been developed and/or modified and tried out experimentally. Additional work is continuing on these tests at the present time. Tests of comprehension of technical material are in use at the present time.

5. *Mechanics.* Previous work both in the Aviation Psychology Program and in other agencies had indicated that the field of mechanical comprehension was one of the most important of all the intellectual areas for the selection of aviation trainees. A half dozen tests have been developed and several existing tests have been adapted to the use of the Aviation Psychology Program. Results obtained with these tests have substantiated the evidence mentioned above, and a Mechanical Comprehension Test has been included for some time in the classification test battery.

6. *Reasoning.* It was assumed that successful performance of any aircrew position would require, among other things, the ability to reason rapidly and accurately. The accumulation of validity data indicated clearly that neither numerical ability nor verbal ability as such had any validity for predicting success or failure in pilot training. That is, tests heavily weighted on the verbal-intellectual or numerical factors yielded consistently low validities against the criterion of graduation or elimination in pilot training. Consequently, the major emphasis in developing reasoning tests for predicting pilot success was placed on tests which were as free as possible from either verbal or numerical loadings. Since a great deal of psychological work had been done in the last thirty years on tests in this field, it was thought desirable to select the most appropriate of these for the initial study of this area. These tests were adapted to the needs of the Aviation Psychology Program. In all eight tests in this sub-area were developed or modified and validated on an experimental basis. The description of one of these tests follows.

The Figure Analogies Test is a new form of the familiar Figure Analogies Test which has appeared, among other places, in the American Council on Education tests. It is generally recognized as a non-verbal reasoning test and was heavily loaded on the non-verbal reasoning factor in the analysis of this battery of tests. This test was administered to 1200 unclassified candidates. Its validity was moderate for predicting success in pilot training. The test yielded satisfactory reliability on several large samples.

7. *Foresight and Planning.* One of the requirements of a successful aircrew member is the ability to plan a series of maneuvers or activites and to foresee and avoid possible difficulties. Eight tests were developed and validated in this relatively new area of test construction. Among these is a Sequence of Maneuvers test which was constructed in such a way as to include many of the problems confronting a student pilot when he is given a number of maneuvers

to practice and must plan to perform then in the most efficient order. In the test the candidate must take into account the altitude at which each maneuver must be performed and the amount of altitude lost or gained, and plan the arrangement in which he is to execute five maneuvers so as to have done the least amount of unnecessary climbing and diving. The reliability of this test is moderate; validity data are not yet available.

8. *Memory.* In an analysis of the reasons stated in Faculty Board proceedings for the elimination of 1,000 pilots in elementary pilot training (1), memory was reported to be of considerable importance as a source of failure. As a result of this analysis, ten tests of ability to retain detailed information were constructed. These tests, in part, represent a systematic variation of a number of the variables which are present in any memory test; e.g., method of presentation, time of exposure, type of material, time between exposure and recall, method of recall, material between exposure and recall, etc. An example of a test in this area may be described as follows. Plane-Name memory is a paired-associates, immediate-memory, pencil and paper test requiring the association of fictitious names with silhouettes of planes. A study page containing a number of planes and accompanied by a label showing their names is presented to the candidate for a brief period. Following this, the candidate is shown the planes and must select the correct names from a list of names. The split-half reliability coefficient of this test is moderately high. Memory tests, in general, have yielded low positive correlations with the criterion of graduation or elimination from pilot training.

9 *Mathematics.* Several tests in the field of mathematics have been developed or modified and employed for classification testing in the Aviation Psychology Program. As in the case of tests that are primarily loaded with the verbal-intellectual factor, it has been found that tests primarily loaded with the numerical factor are not valid in the pilot area, but are valid for predicting navigator success.

The first classification battery administered at PRU No. 3 contained a Mathematics Test which had been constructed at PRU No. 1. It was found possible to revise this test, and adjust it more specifically to the requirements of navigation training. Two transitional forms led to the development of the present classification Mathematics Test. For obvious reasons, this test cannot be described in detail, but it can be said that it measures mathematical competency with emphasis chiefly on algebraic manipulation.

Validation of scores on this test against performance in advanced navigation training for a variety of populations yielded consistently high validities. Since navigator classes have been characteristically drawn from candidates in the upper half of Aviation Cadets in navigation aptitude, the range of ability is restricted; if the whole range had been included, the validity coefficients would have been substantially higher.

Two test-retest reliability coefficients for different forms of this test based on intervals in both cases of three months or more were very high.

In addition to this test, several other mathematics tests have been employed for classification purposes. These tests were developed at PRU No. 3 and at other psychological units. These include a test of speed and accuracy of simple arithmetical computation and a test requiring speed and accuracy in estimating the approximate result of a sequence of arithmetical operations.

One of the most interesting tests developed by PRU No. 3 is a test known as Instrument Comprehension. This test consists of two parts

which appear to measure speed and accuracy in selecting from a series of photographs the plane whose attitude in flight corresponds to that indicated on an accompanying group of dials and instruments. This test has yielded considerable validity on several large samples of candidates. The product moment correlation between scores on this test and the composite pilot aptitude score derived from the classification battery for a large sample was such that the addition of this test to the classification battery added significantly to the resulting multiple correlation. This test is included in the most recent classification battery.

In general, results obtained on tests in the area of intelligence, judgment, and scholastic achievement support the following generalizations: (1) Tests with heavy verbal-intellectual loadings are not valid for selecting pilots, but yield considerable validity in the prediction of navigator success. (2) Tests wholly or primarily numerical in content are not valid in the pilot field, but are valid for predicting navigator success. (3) Mechanical and informational tests are valid for the selection of pilot cadets.

Since the tentative areas of test construction were investigated by constructing a number of tests in each, the use of the factor techniques was suggested. Factor analysis has proven useful in several ways. Perhaps the most important use has been the empirical revision of the original *a priori* categories of test construction. Some tests based on the new factor categories have now been validated for pilot training, and several of them for navigation training. The results of factor methods have also served as guides in the selection of the few tests of a larger group showing most promise for immediate validation. Finally, with the accumulation of knowledge of factors and their validity, it has been possible to revise old tests and to construct new tests in line with that knowledge.

In addition to research in the field of intelligence, judgment, and educational achievement, the personnel of PRU No. 3 have developed, constructed, or modified for use in the Aviation Psychology Program one test in the field of emotion, temperament, and personality; five tests in the field of motor skills, two of which have been adopted for classification use; and three perceptual tests. Several of these tests have shown considerable correlation with the criteria.

In the new organization of the Aviation Psychology Program, the research function of PRU No. 3 will continue to be the development and construction of tests in the field of intelligence, judgment, and scholastic achievement. The staff that was responsible for research and test construction for the Aviation Cadet Qualifying Examination, formerly located in Washington, has been transferred to PRU No. 3 since the end of the period covered in this report. This move will facilitate closer coordination of research, test construction, and editorial work on the quali-

fying examination and classification tests. Also now located at the Santa Ana Army Air Base and coordinated with PRU No. 3 is a Psychological Test Film Unit. In addition to the research on classification problems, PRU No. 3 will undertake research on problems of training.

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THE OFFICE OF PSYCHOLOGICAL PERSONNEL REPORT FOR THE YEAR 1943

DONALD G. MARQUIS

In February 1942, the Office of Psychological Personnel was established under the auspices of the National Research Council. It was felt that the effective utilization of psychology and of psychologists in the war effort called for a central clearing house of information, and that the emergency demands of the war situation required a central executive agency which could promote more effective service by the profession as a whole.

The Office of Psychological Personnel has been housed in the building of the National Academy of Sciences at 2101 Constitution Avenue, Washington, D. C. Space was provided by the Division of Anthropology and Psychology of the National Research Council with the generous cooperation of the officers of the Council. During the first few months of its existence, the Office of Psychological Personnel was supported financially by emergency grants from the National Research Council and the American Psychological Association. The continuation of the Office was assured subsequently by regular appropriations from several of the national associations of psychologists, as detailed in the financial statement at the end of this report.

At the time of its establishment the Office of Psychological Personnel was charged with the promotion of "the maximum effective use of psychologists, irrespective of society membership, in the war effort." The absence of specific instructions and limitations has made possible a flexibility which was highly desirable during the period of development of the Office. As the nature and demands of the war situation have changed, the Office of Psychological Personnel has shifted some of its functions and has developed new ones. During the course of the year it has been possible to devote increasing attention to the problems of the profession in the post-war period. The Director of the Office of Psychological Personnel has reported regularly to the Emergency Committee in Psychology of the National Research Council and to the national associations of psychologists. Frequent and valuable advice has been secured from Dr. Leonard Carmichael, Chairman of the Division of Anthropology and Psychology of the National Research Council, and from the three official Consultants to the Office of Psychological Personnel: Dr. Robert M. Yerkes, member of the Emergency Committee in

Psychology; Dr. Willard C. Olson, Secretary of the American Psychological Association; and Dr. Alice I. Bryan, Executive Secretary of the American Association for Applied Psychology.

The effective utilization of psychologists seems to demand three general avenues of effort: the collection and filing for ready use of accurate and up-to-date information about psychologists; the discovery and promotion of job opportunities for psychologists; and the closer integration of the demand for and the supply of certain kinds of psychologists, by means of modification of present training programs.

To accomplish the *first objective* the Office of Psychological Personnel has established a coded file of approximately 6000 psychologists. One section of the file contains information about more than 2000 psychologists who are in military service. Another section of the file contains the registration forms submitted by psychologists who wish to be considered for change in employment. The number of names in this file has varied between 600 and 1100 during the year. No attempt is made to collect detailed information about the remaining group of psychologists. The files of the National Roster of Scientific and Specialized Personnel are utilized in those instances when a selection of names from the total group of psychologists is desired.

The *second objective*—the discovery and promotion of job opportunities for psychologists—involves a variety of activities. Knowledge of the existence of the Office of Psychological Personnel is often sufficient to elicit requests for aid from prospective employers. Through personal conferences a continuing effort is made to bring the service of the Office of Psychological Personnel to the attention of officials in the various branches of the armed services and in the federal war agencies. In special cases it has been possible to consult in the formulation of qualifications for new positions such that individuals with psychological training and experience will be eligible to apply. With the partial exception of the centralized war agencies, the creation of new job opportunities for psychologists will necessarily be dependent upon the initiative and foresight of individual psychologists who are in closest touch with the field of opportunity. The Office of Psychological Personnel should find its greatest usefulness in those areas where psychologists are not at present employed. When personnel is again available, a definite program should be instituted to inform such school systems, hospitals and state institutions, industries, and guidance centers of the possible services of psychologists.

The *third objective* is less tangible and requires special study before recommendations can be made. During the war period there has been a critical shortage of psychologists with special technological skills: statistics, test construction, psycho-physiological research methods, and methods of attitude and opinion measurement and analysis. The Army

found an insufficient number with experience in personnel methods, interviewing, and occupational analysis, and therefore undertook to train such persons in the special schools of the Adjutant General's Department and in the Advanced Personnel Psychology course of the ASTP. A survey, described below, is being carried out by the Office of Psychological Personnel to provide a basis for estimating the relation between supply and demand in the various psychological fields after the war.

Military Service

Psychologists desiring to secure commissions for specialized work in the Army and Navy have been given information about opportunities and proper channels, and their qualifications have been brought to the attention of those in charge of officer procurement. In the course of the year direct commissioning was eliminated in the Army and drastically reduced in the Navy.

When any psychologist who is registered with the Office of Psychological Personnel is inducted, a statement of his training and experience is forwarded to the Office of the Adjutant General, the Bureau of Personnel and Training, USN, or the Research Division of the Office of the Surgeon, Army Air Forces. In instances of specially qualified persons, information may be sent to other offices such as the Surgeon General of the Army or Navy, the Office of Strategic Services, etc. This statement is used in effecting the proper classification of the individual in the Service. Whenever possible a follow-up is made to determine whether the assignment of the individual is such as to permit utilization of his professional qualifications. Several requests, involving hundreds of individuals, have been received from branches of the Armed Services for lists of qualified psychologists for reassignment to new duties. In order to keep up to date the information about psychologists in service, two questionnaires have been circulated during the year.

Army Specialized Training Program. In December 900 of the 1300 students in the Advanced Personnel Psychology Course completed their program and were assigned to Army units. Some time previously the Office of Psychological Personnel gave assistance to the Classification and Replacement Branch, AGD, in a survey of needs for psychologists in the Army. Between the inception of the AST program and its termination many features of the general Army situation had greatly changed. Anticipated needs for psychologists in induction and reception centers and in special training units had been eliminated by the rapid growth of the Army and by changes in Army procedure. Officer Candidate Schools had also been severely curtailed during this period. New needs, however, had developed along different lines, and the ASTP graduates received assignments to personnel duties in various units of the Ground Forces, the Service Forces, and the Air Forces.

Certain instances of assignments which went wrong for one reason or another have been discovered and brought to the attention of the AGD with satisfactory outcome. A systematic follow-up survey was also made with the cooperation of the Course directors about a month following graduation. In all these activities the Office of Psychological Personnel has worked in close cooperation with the military officials, and the experience has made it clear that the peculiar advantages of a civilian office can effectively supplement the military procedures.

Federal Agencies

Continuing contact with representatives of government war agencies is necessary to keep up with the varied and rapidly changing needs for psychological personnel. The Director has consulted in these matters with the following:

Civil Service Commission
Civilian Personnel Division, Office of the Secretary of War
Division of Program Surveys, Department of Agriculture
Foreign Broadcast Intelligence Service, FCC
National Research Council
Office of Price Administration
Office of Scientific Research and Development
Office of Strategic Services
Office of War Information
Veterans Administration
Vocational Rehabilitation Division, FSA
War Manpower Commission, FSA
War Production Board

Job Referral Service

During the year 215 requests were received from prospective employers of psychologists, not including the military services. Table I presents a breakdown of these requests and the outcome as determined by a follow-up inquiry.

The acute shortage of well qualified and experienced psychologists is reflected in the fact that no placement was made in 118 out of 215 prospective openings. It is normally to be expected that a certain number of jobs will fall through after preliminary inquiries are made, but this large proportion reflects the general instability of the employment situation as well as the scarcity of good applicants.

The analysis indicates that placement was made from Office of Psychological Personnel referrals in 54 percent of the positions in which any placement was made. The referrals were apparently most effective for positions in federal agencies and war research projects—reflecting probably a better understanding of the job qualifications based on personal conferences in Washington with the prospective employer.

TABLE I

ANALYSIS OF JOB REQUESTS

Employer	Total requests	For information or no placement made	Placement made	Placement from OPP referrals
Colleges, universities	67	31	36	15
Industries, consulting organizations	12	6	6	4
Schools	4	0	4	1
Clinics, guidance centers	20	12	8	2
State hospitals, other institutions	14	8	6	3
Public personnel agencies	12	9	3	2
Federal war agencies	46	34	12	7
Other federal agencies	13	9	4	3
War research projects (OSRD, NDRC, NRC, CMR)	27	9	18	15
Totals	215	118	97	52

EMPLOYMENT SURVEY

During the second half of the year it became apparent that the services of the Office could be increased in effectiveness by a systematic survey of the employment of psychologists. Other groups interested in planning for the profession indicated that they could make good use of the results of such a survey. The Council of the APA discussed the need for a survey of the nature of post-war employment problems; the APA Committee on Graduate and Professional Training needed factual data on the functions psychologists are called upon to perform; the Emergency Committee discussed the need for a directory of the war activities of psychologists; and the Survey and Planning Subcommittee recommended other items of value. To avoid the burden and expense of several independent circularizations, the Office of Psychological Personnel undertook to prepare and distribute a single questionnaire which could fulfill the several objectives.

This questionnaire was mailed in December to a list of 6000 psychologists who had at least one year of graduate training. Of these, 4000 are members of the APA or AAAP; the other names were secured from affiliated organizations and from the files of the Office of Psychological Personnel and the National Roster of Scientific and Specialized Personnel. The returned questionnaires will be coded and punched on I.B.M. cards for machine sorting. The 1300 graduates of the ASTP course in Psychology were also circularized to determine their background in psychology and their plans for further training or for employment in the field after the war.

Information Services

One of the inevitable and one of the most useful consequences of the establishment of an executive professional office is the centralization of informational services. As the Office of Psychological Personnel has become known it has received inquiries from a variety of sources concerning many items: references and bibliographies, tests, the names of experts in certain fields, opportunities for graduate training, procedures for certain professional activities, etc. Many of the inquiries are referred to individuals better qualified to deal with them. The Director comes to learn what is going on in different circles through his personal contacts and his ex officio membership on Committees of the various psychological organizations, and is thereby enabled to suggest methods of integration and elimination of duplication, and to refer ideas from various sources to persons and groups capable of carrying them out.

The Director serves as Editor of the monthly section on "Psychology and the War" of the *Psychological Bulletin*, which is designed to present a current picture of the war-time activities of psychologists. Most of the articles and notes are directly solicited, and two articles dealing with Rehabilitation activities and with Social Psychologists in War Agencies have been prepared specially. Talks by the Director have been presented before several groups which were interested in the role of psychology in the war effort.

Staff of the Office

The first Director was Steuart Henderson Britt, George Washington University, who resigned in May, 1943, to accept a commission as Lieutenant in the USNR. In July, Donald G. Marquis, Yale University, was appointed Director on a part time basis. Miss Iris Stevenson, Assistant to the Director, resigned in July to accept appointment as Ensign in the WAVES, and was succeeded by Mrs. Jane D. Morgan.

Financial Statement and Budget

On the following page there will be found a financial statement of the Office of Psychological Personnel, which shows the Receipts and Expenditures of the Office for the year 1943, together with the Budget under which the Office of Psychological Personnel is operating during the year 1944.

OFFICE OF PSYCHOLOGICAL PERSONNEL

FINANCIAL STATEMENT—1943

RECEIPTS

Balance on hand	$ 437.21
American Psychological Association	10,000.00
American Association for Applied Psychology	1,000.00
Society of Experimental Psychologists	100.00
Society for the Psychological Study of Social Issues	50.00
	$11,587.21

EXPENSES

Salaries (Director, Assistant, Secretarial and Clerical help)	$ 7,233.56
Office expense (postage, mimeographing, printing, telephone and telegraph, supplies)	1,405.92*
Travel	1,289.96
Reprints	205.73
Office Furniture and Equipment	315.50
	$10,450.67
Balance†	1,136.54

* Approximately $1,000 of this item is for postage and printing in connection with the Employment Survey conducted in December, 1943.

† Refund was made to the American Psychological Association $ 1,033.22
and to the American Association for Applied Psychology 103.32

BUDGET FOR 1944

Estimated Receipts

American Psychological Association	$10,000.00
American Association for Applied Psychology	1,000.00
	$11,000.00

Estimated Expenses

Salaries		$ 6,630.00
Director	$ 800.00	
Assistant	2,200.00	
Stenographers (2)	3,120.00	
Occasional clerical	510.00	
Office expense		400.00
Travel		2,500.00
Reprints		100.00
Miscellaneous		370.00
		$10,000.00
Balance		1,000.00

A STUDY OF 400 PSYCHOLOGISTS COMMISSIONED IN THE U. S. NAVAL RESERVE

C. M. LOUTTIT, COMMANDER, USNR
Bureau of Naval Personnel

There has been abundant evidence that psychologists have found a wide usefulness in war activities of all sorts. This is as true in the Navy as it is in Army or civilian activities. In previous papers, Bremner (1) Jenkins (2) and Louttit (3, 4), have written concerning psychologists commissioned for duty in the Navy. In the earliest of these papers published in 1941, Louttit described the type of psychological work then in prospect and concluded by saying "at the present time the billets available approximate 50 and there is encouraging progress in filling these." In 1943 the same author summarized the duties of 148 officers then on duty. The data of this second paper were recognized as being incomplete, but were the best available secured by inquiry from the officers having charge of different types of programs.

With the successful operation of an Officers Classification Section in the Bureau of Naval Personnel, it became possible to tabulate the names of officers with special qualifications by use of IBM equipment. Through the generous cooperation of Lt. Comdr. J. C. O'Brien, a list of 329 names of persons having a master's or doctor's degree with a major in psychology was secured. There were added to this list 86 additional names of officers working in special psychological programs which for some reason or other had not been tabulated by the machines. The total group numbered 415. It is to be noted that the only criterion used to define psychologist was the possession of a master's or doctor's degree. As will be seen later, there were included a considerable number of persons who while they had received graduate degrees in this field were either known not to be professional psychologists or had failed to become members of the national associations. However, for the purpose of this study it was decided to analyze the total group. Separate checks were made on the rank, reserve classification and present duties and duty station as of January 1, 1944.

Civilian occupation. Unfortunately, methods of determining the specific civilian occupations of all of these people were not reasonably available. However, a tabulation from the civilian occupation codes of the 329 officers listed by the Classification Section indicated the following major groupings: psychology, 182; education (including teaching other than psychology) 97; personnel work, 17; and miscellaneous (business, science, engineering, etc.), 33. Thus 60 percent of this group of officers were engaged in psychological activities in civilian life.

Association membership. As another possible indication of the pro-

portion who would, without doubt, be considered professional psychologists, the names were checked against the membership lists of the American Psychological Association and the American Association for Applied Psychology. Table I shows the distribution of membership by

TABLE I
ASSOCIATION MEMBERSHIPS

APA, Member	5
APA, Associate	115
AAAP, Fellow	1
AAAP, Associate	1
APA, Member; AAAP, Fellow	12
APA, Associate; AAAP, Fellow	15
APA, Member; AAAP, Associate	1
APA, Associate; AAAP, Associate	12
Total	162
Non-members	253
	415

association and class. The data of this table are not to be taken as indicating that those who were not listed as members were not professional psychologists. In accidentally determined cases individuals known to have been engaged in psychological activities in civil life were not members of associations. In many cases the civilian profession was in education or some similarly related field. For our purposes it seemed to be unwise to attempt in each case to make a subjective decision as to whether or not that individual should be included. It should, however, be of interest to the officers of the associations that only 40 percent of these people having graduate degrees in the field were members of professional societies.

Reserve class. Officers in the naval reserve are assigned to certain classes which roughly indicate the nature of special activities in which they might be engaged. Most of these classes are considered line officers as distinct from staff officers although their specialized duties very probably would never involve line functions in the technical sense. In Table II are shown the several reserve classes in which this group of psychologists have been commissioned. In the case of the ordnance, engineering and certain aviation groups as well as the staff classes, supply and chaplains, it seems reasonable that most of the individuals had probably not engaged in psychological activities in civil life in spite of their graduate degree. However, these groups represent a relatively small proportion of the total.

Table II also gives information concerning the use of women psychologists. Of the total 415 individuals, 47 are in Class W-V(S) which is the symbol for the women's reserve. As can be determined from Table

III a majority of these women have duties either in psychological or in closely related educational or personnel activities.

Rank. As of January 1, 1944 psychologists in the group under consideration held commissions from Ensign to Commander. The majority of them were of course in the lower ranks although the modal point with 132 were Lieutenants (junior grade). It is interesting also to note from this table that with increasing rank there was a higher proportion holding the Ph.D degree. These percentages may be summarized as follows: Ensign, 24; Lieutenant (jg), 30; Lieutenant, 53; Lieutenant Commander, 75; Commander, 100.

TABLE II
NAVAL RESERVE CLASS AND RANKS

Class	Comdr.		Lt. Comdr.		Lt.		Lt. (jg)		Ens.		Total
	PhD	MA	PhD	MA	PhD	MA	PhD	MA	PhD	MA	
D-VS, Deck-specialist	3		7	1	29	25	11	54	7	22	159
D-VG, Deck-general						2		3	1	12	18
H-VS, Hospital-specialists			6	2	27	12	20	12	12	16	107
A-VS, Aviation-specialists			1	1	6	16	5	13	3	3	48
A-VN, Naval aviators						2	1	1			4
A-VT, Civilian pilot					1						1
C-VS, Communication								2	1	5	8
C-VX, Communications	1		1		2		3				7
I-VS, Intelligence				1		1		3		1	6
SC-VG, Supply, general						1				2	3
SC-VS, Supply, specialist										1	1
CH-CS, Chaplain					1			1			2
E-VG, Engineering								1			1
E-VRS, Electronic engineer						1					1
O-VS, Ordnance						1		1			2
W-VS, Waves					2	2	3	10	2	23	42
W-VSH, Waves, hospital					1		1			3	5
Totals	4		15	5	69	63	44	101	26	88	415
Totals by rank	4		20		132		145		114		

Duties. Probably the question of greatest interest is the duties being performed by psychologists. It is impossible from records available in the Bureau to determine the exact duties of an officer. The questionnaires from which the IBM cards were made contained the officer's description of his duties which were then reduced to a code symbol. From records in the Bureau present duty station was checked. From these two avenues it has been possible to condense in a reasonably accurate and satisfying picture the duties shown in Table III. In this table there are 4 major categories. The first, psychology, includes all those officers definitely known to be doing specific psychological activities either in connection with selection and classification of personnel, in

connection with aviation psychology, or in cooperation with psychiatrists in the initial medical examination of recruits or in Naval hospitals. The second category, education and personnel, include officers having duties on the staffs of schools, development of training aids, in officer procurement, or in connection with personnel pools where the duties do

TABLE III

DUTY STATIONS BY SEX, MEMBERSHIP AND DEGREE

Duty and/or station	Men				Women				Total
	Member		Non-Member		Member		Non-Member		
	PhD	MA	PhD	MA	PhD	MA	PhD	MA	
Psychology									175
Bureau Naval Personnel	10	3	7	6	1		1		28
Training Station Selection	3	4	4	7	1	1		3	23
Training Station Psychiatric Unit	17	3	4	3					27
Psychiatric billets	7	1	2	1	2	1		2	16
Aviation psychology	32	19	5	12				2	70
Director Naval Communications	6	1							7
Miscellaneous	1		1	2					4
Education and Personnel									97
Training stations		2	3	3				4	12
Schools	4	1	1	10			1	2	19
V-12 Units	2	1	3	5					11
Aviation Training	8	1	2	19				1	31
Officer procurement	3		2	2				7	14
Miscellaneous	2		1	5	2				10
Operational									91
Ships	2	1	1	22					26
Aviation	1	1	1	4					7
Armed guard				9					9
Aviation administrative	5	3	1	18				4	31
Miscellaneous shore	1		2	15					18
Miscellaneous									50
Communications		1		8		1		3	13
Supply				4					4
Ordnance				2					2
Intelligence		1		6					7
Chaplain			1	1					2
Miscellaneous	2	1		11			1	7	22
Missing in action			1	1					2
Totals	106	44	42	176	6	3	3	35	415

not necessarily involve technical psychological procedures. The third category, operational, includes officers on duty at sea, overseas bases or aviation units where their duties almost entirely are naval operational in nature and do not involve psychology at all. The fourth category, miscellaneous, includes a variety of sub-categories which are self-ex-

planatory and in no case do they involve work of a psychological nature.

It is of particular interest to call attention to the operational group including 89 officers, 15 of whom have the Ph.D. degree who are engaged in straight naval duties. While we have no specific evidence, the general impression from studying the data suggests that these are mostly younger men. To some these duties may suggest a waste of specially trained man power but there is good reason to believe that the very characteristics which would make them potentially useful as psychologists also make them of high value in more strictly military types of duty.

Summary. This study of 415 naval reserve officers holding the M.A. or Ph.D. degree in psychology gives the most complete account yet available of the use of psychologists by the Navy. It indicates that in a majority of cases professional training is being utilized directly or in closely related fields; in some cases the graduate work in psychology was apparently incidental and the man is engaged in naval duties in line with his primary occupation; in most of the remaining cases while the naval duties do not utilize psychological training, they are important billets frequently in combat service.

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PSYCHOLOGY AND THE WAR: NOTES

War Department Conference on Planning of Civilian Personnel Testing. Attended by 60 representatives of the various military and public agencies concerned with civilian personnel problems, a conference on planning for testing of civilian employees was held in Washington, D. C., on December 14, 15 and 16 by the Civilian Personnel Division of the Office of the Secretary of War. The conference chairman was Douglas H. Fryer, Chief of the Personnel Research Branch, and the conference manager was Watson O'D. Pierce, Test Construction Advisor, both from Civilian Personnel Division.

By an exchange of information between technical testing personnel in civilian personnel units of the War Department and similar workers in other Government agencies, the meeting had the following objectives as the basis for planning an efficient and comprehensive Civilian Personnel testing program.

1. To compile a list of aptitude, achievement, personality and morale tests or rating scales which have been constructed and operated in various War Department units, or are made available to the War Department by other Government agencies. These measures are to be studied in relation to the standardizations presently available and the probable relationships of present norms to the practical testing situations in training, employee relations and placement.
2. To survey the areas in which tests or measures are immediately required, and to assemble information of possible test construction allocations which could develop new or adapted tests to fulfill these needs.
3. To assemble qualifications and lists of available personnel or personnel engaged in the following activities:
   a. Test administration and interpretation for purposes of training, placement and employee relations.
   b. Test construction and research in the development of tests and rating scales.

On the basis of the discussion during the first two days of the conference, four special planning groups prepared a written summary and set of recommendations on the following topics:

1. Test materials and facilities in civilian personnel units of the War Department (Edward E. Cureton, Chairman)
2. Test materials and facilities available for use in civilian personnel programs in the War Department (Beatrice Dvorak, Chairman)
3. Administration of testing services (Frederick Kuder, Chairman)
4. Qualifications of testing personnel (Donald G. Marquis, Chairman)

It is expected that the report of the conference will be used as a means of developing plans to be submitted to the Secretary of War's Council on Civilian Personnel for establishing the appropriate use of testing and its proper relationship within the civilian personnel program of the War Department.

Walter V. Bingham, Chief Psychologist, Classification and Replacement Branch, AGO, was toastmaster at a luncheon which concluded the third day of the conference. William H. Kushnick, Director of Civilian Personnel and Training of the War Department, spoke on "Portfolio for Measurement in Personnel Management." George Shipman, Chief of the Management and

Organization Section, Bureau of the Budget, discussed "The Management Implications of Personnel Testing in the Government Service."

Proposed Book on the Psychological Adjustment of the Returning Soldier. A manual for the psychological service of returned service men is being prepared under the editorship of Dr. Irvin L. Child of Yale University, who has been appointed editor by the Subcommittee on the Textbook of Military Psychology, acting with the authorization of the National Research Council's Emergency Committee in Psychology. This book is intended to become a companion volume to *Psychology for the Fighting Man*, similar to it in form and in manner of distribution, although somewhat shorter. Miss Marjorie Van de Water of Science Service will be associated with Dr. Child in the editorial task, and they are securing the services of a group of collaborators. The volume is expected to contain materials on the psychological import of shifting from military to civilian life, on the veteran's vocational, family and civic adjustment, and on adjustment to service-incurred disabilities.

Institute of Aviation Psychology. Facilities for research in the selection, training, and maintenance of pilots have recently been expanded by the organization of an Institute of Aviation Psychology at The University of Tennessee. The Institute is supported with funds allotted by the Civil Aeronautics Administration and the State of Tennessee Bureau of Aeronautics. It will be administered by the Committee on Selection and Training of Aircraft Pilots of the National Research Council in cooperation with a special Project Committee of The University of Tennessee and the Division of Research, Civil Aeronautics Administration.

The establishment of the Institute represents the fulfillment of plans formulated by Dean R. Brimhall, Director of Research, Civil Aeronautics Administration, in consultation with the National Research Council Committee on Selection and Training of Aircraft Pilots under the Chairmanship of Morris S. Viteles, University of Pennsylvania.

The Institute of Aviation Psychology, the first in the United States—and possibly in the world—represents a major development in a program of research on the human factor in aviation initiated in 1939 by the Civil Aeronautics Administration in setting up its plans for training a large number of civilian pilots.

At the time of Pearl Harbor, there had already been accumulated in this research program a mass of data and numerous practical methods which were immediately made available to the Armed Services for use in building up a competent force of aviation personnel. During the past three years, the emphasis in research has been on the selection and training of military pilots. The establishment of an Institute of Aviation Psychology at a State University, supported by state as well as federal funds, represents a method of assuring the continuation of such research in the Post-War era with a renewed emphasis upon the problems of civilian flying. Through such an Institute, and others like it at other universities, steps can be taken to avoid the unfortunate cessation of basic and practical research which occurred at the close of the last war.

Special attention is to be given to problems of training and to developing methods of instruction and training aids which can help to reduce failures among student pilots and to decrease the incidence of accidents following the completion of training. The United States has pioneered in such research in work done at various universities, with funds made available by the Civil Aeronautics Administration, under the general supervision of an Executive Subcommittee of the National Research Council Committee on Selection and Training of Aircraft Pilots consisting of: Charles W. Bray, Dean R. Brimhall,

Cdr. Daniel J. Brimm, Leonard Carmichael, Lt. Cdr. Jack W. Dunlap, Lt. Col. John C. Flanagan, Harry M. Johnson, Walter R. Miles, G. R. Wendt, and Morris S. Viteles, Chairman.

In the proposed studies at The University of Tennessee, there will be available findings and apparatus which make possible an accelerated program of research and training. Among these is an airborne model of a magnetic wire recorder which allows the recording of instruction given in the air and an analysis of comments made by instructors doing check flights. Research planes are also equipped with a motion photographic installation recording systematically the movements of airplane controls and of the attitudes of the plane during flight—whether it slips or skids, loses or gains altitude, etc. "Patter Books" or standard instruction guides, flight inventories, and many other similar tools will be used in the integrated program of research on training at the Institute of Aviation Psychology.

Student pilots will be drawn from civilian residents of Knoxville and its vicinity who will be trained on a University airport. It is anticipated that many of these will be high school students below age for the Services. Others will be men rejected for physical reasons by the Armed Services, who will provide an opportunity for the exact experimental determination of what constitutes a physical handicap to flying. Student pilots will be awarded "fellowships" for training. They will be required, however, to take this training under conditions which will make it possible to determine the effect of various methods of training upon the acquisition of flying skill.

Research projects will be planned jointly by Robert Y. Walker, formerly of the Ohio State University, Director of the Institute, the Project Committee of the University of Tennessee, including E. S. Fabian, K. L. Hertel, P.B. Stockdale, and E. A. Waters, and the Executive Subcommittee of the Committee on Selection and Training of Aircraft Pilots in consultation with the Division of Research of the Civil Aeronautics Administration. The Institute staff will include R. E. Dunford and S. E. Torsten Lund, of the University of Tennessee, as well as others drawn from current projects of the Committee on Selection and Training of Aircraft Pilots. It is anticipated, however, that work will continue on a number of projects centered at other universities.

Notice. The Office of Psychological Personnel has received urgent inquiries from several government agencies engaged in essential war work for men who have demonstrated ability to plan, carry out, and report research studies in any of the various fields of psychology. They must not be subject to call by Selective Service, i.e., they must be in Class 4F or over 38 years of age. Salaries available are $3800 and $4600 plus overtime. Persons interested should notify the Director of the Office of Psychological Personnel, 2101 Constitution Avenue, Washington 25, D. C.

BOOK REVIEWS

MEIER, N. C. Military psychology. New York: Harper, 1943. Pp. xx+395.

To the small list of books on military psychology already on our bookshelves another volume was added in the fall of 1943. Professor N. C. Meier, the author of this newest book, is a veteran of World War I. Over the years since 1919 he has retained his interests in things military. He has put down his current beliefs in this book and in a recent journal article.[1] Not content to present the data of his book in a "take it or leave it" style, Meier has made a serious attempt to put himself in the position of the prospective private or officer and to see what psychology has to offer for every situation which might arise.

The book opens with a foreword by Lieutenant General Ben Lear which by implication assures the reader that the military facts of the volume are essentially correct. After the author's preface come the eight major chapters of text. These latter in turn are followed by eight parallel chapters of applications and problems. These problems are well considered and could readily serve as the meat for many discussion sessions of the sort fostered by the English universities for the British soldiers but so far relatively uncommon among the American forces. The book closes with four appendices which deal with such topics as "suggestions for handling interviews," "requirements for miscellaneous services," "a rating scale for candidates for officer training schools," and "proposed additional methods for selection of combat officers." There is a glossary of terms and an index.

Meier's first chapter on "why men fight; group conflict" is excellent propaganda for democracy, more appealing perhaps to the naïve than to the sophisticate. The latter may well lift eyebrows at the following quotation and wonder if Meier did not have tongue in cheek while writing it.

> In democratic nations which permit freedom of expression, propaganda is freely used—but with a significant difference. Any person, any group, any corporation, even the government, *may* indulge in an effort to arouse interest in and support for its point of view. This is taken for granted. But the government, as a matter of state policy, carefully refrains from so doing. Those citizens who are the temporary administrators in power prefer to execute the people's will. They permit others to debate the issues; they expect Congress likewise to sense the wishes of the people and, when known, to enact measures to put them into effect (17).

There is a footnote after the words "so doing" which reads "Statement to the writer by Assistant Secretary of State A. A. Berle, Jr."

Chapters II and III deal with "psychological aspects of warfare" and "preparation of combat morale" respectively. These topics have been carefully considered and are in line with current psychological thought. At the end of these and other chapters are excellent bibliographies. Following each German reference is a brief abstract furnished by the Committee for National Morale.

The next two chapters concern the "adaptation of skills to military needs" and "learning military skills." These discussions are good and possess added

[1] Meier, Norman C. The introductory course and military psychology. *Psychol. Bull.*, 1943, 40, 787–790.

interest through the presentation of five of the book's six illustrations. (More graphs and tables judiciously scattered through the volume would in all probability have added considerably to the layman's enjoyment of the book.) As was to have been expected, Meier seems more at home in discussing visual data than he does in considering facts about the other senses. His section on camouflage is particularly interesting.

The last three chapters go over into the social and abnormal fields. The style becomes more fatherly and so possibly less interesting; yet the preachings are all decidedly worth-while. Here, and elsewhere in the book, certain of the words which the author desires to have emphasized are italicized. Normally, such a procedure makes for more intelligible reading. However, Harper and Brothers, publishers, have, for some reason or other, altered the slant of the letters of these italicized words so slightly from the vertical that the reviewer—and others with whom he discussed the issue—found that considerable eye disturbance rather than the desired reading-ease resulted.

Meier's *Military psychology* is similar, in some ways, both to *Psychology for the fighting man*[1] and to *The psychology of military leadership*.[2] Like the former it presents a large number of psychological facts to the prospective and present-day soldier. Like the latter it speaks with military authority and with an air of giving fatherly advice. Meier's book does not present so many psychological data as does *Psychology for the fighting man*, and is weakest in the field of perception, which is just the area in which the latter is strongest. As it overlaps but little with this book and not too greatly with *The psychology of military leadership*, all three books should find places in the libraries of those dealing with problems of military psychology.

The style of *Military psychology* makes for harder reading than does that of the National Research Council's offering. Partly for this reason and partly because its data are less spectacular it seems suited more to the introspective sort of private or officer who is willing and anxious to spend much time mulling over the text and questions. Notwithstanding a statement to the contrary in General Lear's foreword, the book is not adapted to do duty as a high school text. The psychologically untrained soldier will not read Meier's chapters with the same thrill that he will the Council's—with the growing belief that here are numerous startling facts he can readily put to work. He will feel that many if not most of the observations are closer to common sense than to science. Yet he will be amply repaid for the time he spends on the book's approximately 400 pages.

PAUL R. FARNSWORTH.

Stanford University.

CHILD, I. L. Italian or American? The second generation in conflict. New Haven: Yale University Press, 1943. Pp. 208.

Choosing New Haven, where approximately 17% of the population are second generation Italians, Child has studied the resolution of the second generation conflict. It is unfortunate that so small a group of actual informants could be secured: three life histories, 12 informal interviews, and 53 standardized interviews. The inadequacy of this sampling is partially offset by the author's general acquaintance in the Italian community.

In any study of this type the method of interpreting data is the crucial

[1] National Research Council. Psychology for the fighting man. Washington: *The Infantry Journal*, 1943.

[2] Pennington, L. A., Hough, R. B., & Case, H. W. The psychology of military leadership. New York: Prentice-Hall, 1943.

point in establishing the validity of conclusions. The use of psychological principles largely evolved from animal learning and conditioning seems strange here where the basic problems are emotional and motivational. Reinforcement, extinction, avoidance learning, generalization and differentiation are the primary psychological principles considered. Nor does a comparison with the Hovland-Sears "conflict board" seem sufficient for interpretation of the resolution of the second generation conflict. The problems of this generation must of necessity be far more than the "double approach-avoidance conflict of every day life."

In spite of these weaknesses psychologists will find much of interest in the three types of reaction which Child concludes represent the resolution of the second generation conflict. The *rebel reaction* arises from the choice of one of the two incompatible goals, in this case the American. "Yankee" rejection constitutes a strong barrier, and resultant frustrations arouse reactions of aggression toward the Italian group, projection of one's frustrated desires on one's children, and an occasional exaggerated emphasis on being American. The *in-group reaction* arises from the alternative choice of accepting the Italian goal. The barriers erected by the American group retain their character as barriers, with the individual striving for the dominance in American society of the Italian group with which he has identified himself. The *apathetic reaction* is the least satisfactory of Dr. Child's conclusions. It is described as a retreat from the conflict situation in the avoidance of both goals, the individual "changing his memory and his perception of the world around him in such a way that the arousal of tendencies to seek affiliation with either the Italian or the American group is reduced to a minimum." It seems to the reviewer that the apathetic reaction arises not from the desire to go toward either of two incompatible goals, but from the lack of psychological identification with either the parental or the environmental pattern. Being largely unconscious, this reaction is least accessible with interview techniques.

In his discussion of the rebel group Child points out that half display this reaction in relation to the parental family; and in the in-group "the reaction tends to be associated with an especially strong loyalty to the family." Yet the dynamics of the family situation are largely disregarded in making interpretations. In the briefly mentioned three life histories the importance of the parental attitude is clearly seen. The whole study would have been greatly strengthened by a more detailed consideration of the dynamics of this situation, which perhaps could have best been done through the inclusion of more life histories and a detailed consideration of them. For it is from the life history of the individual that the real sources and directions of his conscious and unconscious solutions of the second generation conflict can be perceived.

DOROTHY TILDEN SPOERL.

American International College.

JENNINGS, H. H. Leadership and isolation. New York: Longmans, Green, 1943. Pp. xv+240.

Dr. Jennings has collaborated for over a decade with J. L. Moreno in the development and use of a "sociometric test." As first devised this consisted merely of listing, in order of choice, the five members of a group with whom one would like to live or work. The author's present investigation among the 450 inmates of the New York State Training School for Girls represents, as Gardner Murphy states in his Foreword, "the coming of age of a number of the sociometric procedures." In this study the subjects were free to express an unlimited number of rejections, as well as of positive choices, and careful personality analyses were made of the popular and unpopular girls.

The confidence of the subjects had been gained through their participation in previous sociometric studies. Their cooperation was further elicited by discussing the investigation with them and giving them some influence in shaping its course. The main request made of each girl was that she list the members of the institution with whom she would like to live and/or work. The reliability of such choices has been found in other studies to be high (always over .90). Eight months later the investigation was repeated. The subjects were mostly sexual delinquents between 12 and 18 years of age; they were all non-psychotic and of normal intelligence.

The girls averaged eight positive choices and four rejections. Of a girl's positive choices, approximately 35% were reciprocated; of the rejections, only about 20% were reciprocated. The author feels that the low degree of positive mutuality is not necessarily indicative of social maladjustments. In many instances the individual likes to have another person around because he is jolly or resourceful, without caring particularly whether or not the attraction is reciprocated.

A correlation of about .60 between the two tests, eight months apart, indicated that though inter-personal relations were somewhat fluid, stability predominated. Age, intelligence, and length of residence showed no significant correlation with the degree to which a person was chosen.

The leaders, as Dr. Jennings calls the popular girls, were described by the housemothers as co-operative, requiring no special attention, having greater insight into their own and others' behavior, making the most of opportunities, doing more than their share of the work, being more reticent, and showing planfulness, initiative, ingenuity, and rebellion against arbitrary authority. These girls had more even dispositions than the least chosen ones, and showed more solicitude for others, especially for those needing help. The least chosen girls were characterized by more complaining, sulking, quarrelsomeness, nervousness, bossiness, interrupting or interfering with group activities, non-cooperation, attention demanding, and spreading of slander and rumors. There were no significant differences between over- and under-chosen with regard to generosity and to cleanliness, neatness, or other personal habits.

Though many traits were found more frequently among the leaders than among the relatively rejected members of the community, there was no one leadership type of personality. One girl might be popular chiefly because of a vivid, energetic personality which bubbled with enthusiasm for one interesting activity after another. A second leader might be attractive mainly because of her quiet helpful interest in her friends. The group was composed of many types of personalities and each leader seemed able to fill only the needs of certain types. Leadership resided not exclusively in the leader herself, but in the interaction between leader and followers.

Exception might be taken to the use of the term "leaders" to describe the persons with whom people like to work and live. The author furnishes no evidence to indicate that all such persons would necessarily be chosen for positions of leadership. The use of the term leadership is but one illustration of the use of a rather grandiose terminology to cover relatively simple and limited phenomena. One wonders, also, whether the "sociometrist" is justified in coining as many elaborate terms as he does. Many chapters bog down with definitions and with slight correlations among unimportant but impressively worded variables. This sometimes prevents the significant contributions made by the author, in this important area of compatibilities and antipathies, from standing out as clearly as they might.

CLARENCE LEUBA.

Antioch College.

WOLFF, WERNER. The expression of personality: experimental depth psychology. New York: Harper, 1943. Pp. xiv+334.

The concept of "personality" is both illusive and tantalizing. Although the term is used freely both by laymen and psychologists, a truly satisfactory definition is not easy to formulate. Wolff, who takes the point of view that "personality is the collective name for the total manifestation of man" (6) is of the opinion that the range of behavior therein included is so great that the term loses its value for scientific purposes. Hence it becomes necessary to isolate certain more limited features for detailed study. At the same time he emphasizes the essential unity of the person, a pervasive one-ness that permeates the entire being and impresses its own individual stamp upon structure and function alike. There is no aspect of form or feature, no individual movement or posture, no action nor achievement but carries its own meaning for him who can read the signs.

Thus, although he points out the practical necessity of investigating single aspects rather than the entire range of the personality, Wolff's experimental approach is radically different from that with which the generality of American psychologists are familiar. The features that he attempts to isolate are not "traits." They are signs, indicators, tendencies that characterize the mass of human beings and thus serve as base lines from which individual variants may be isolated and studied.

This monograph summarizes the results of an extensive series of highly provocative experiments which were begun in Berlin in 1925 and have been continued, later in Spain and most recently in the United States, up to the present time. The intriguing feature of all these studies is the direction of attack which, in sharp contrast to most American studies, is synthetic rather than analytic. Instead of asking, What are the objective signs by which Traits A, B, and C can be recognized and differentiated? Wolff begins with the sign and seeks to ascertain its significance. Moreover, he never limits his possible sources of evidence by forcing the responses of his subjects into a small number of categories that are usually inadequate and sometimes downright misleading. Instead, his questions are broad, non-suggestive as to the type of answer expected. Most important of all, there is, as a rule, no predetermined "right" or "wrong" answer. This is illustrated by his experiments in judging personality from photographs. Instead of starting with the assumption that a particular photograph "portrays" a given emotion or personality type merely because some actor has endeavored to convey that impression when posing, photographs are taken when the subject is unaware that he is being photographed and when he is not under conditions of such unusual stress that the external features of the experiment are likely to mask the internal aspects of the individual personality. These pictures are then submitted to a number of judges individually who are asked simply, "What kind of person do you think this is? Make the best estimate that you can of his personality and character." The same general procedure has been followed with photographs of the hands, specimens of handwriting, recordings of the voice, moving pictures of the gait and of such motor performances as ring-tossing.

The monograph is divided into three parts. The first part is essentially an evaluation of method. The influence of American demands for objective validation of results is clearly seen and frankly acknowledged by the author, but he does not become so preoccupied with statistical computations that he loses sight of the broader issues. His concern here, as indicated by the part-title is with the *Unity of Personality*. The questions that he attempts to answer are, first, How closely do observers agree in their judgments of personality from such external signs as those which have been mentioned? To what extent does the

amount of agreement exceed chance? How successful are attempts to match different expressive signs obtained from the same persons, e.g., faces to hands or voices to handwriting?

The devices employed for testing these questions are varied and ingenious. In general the findings obtained were somewhat more positive than would be expected by chance although the rigid statistician will find grounds for questioning a number of the conclusions, especially in view of the small populations employed in most of the experiments. But this does not affect the freshness and originality of the general approach.

Part II, entitled *Self-Confrontation*, is by far the outstanding section of the monograph. Here we have an objective research into the realm of the so-called *Depth Psychology* that has rarely if ever been surpassed. The general procedure employed in a long series of studies utilizing various kinds of material was as follows: The subject was shown a number of specimens of expressive phenomena, one of which was his own. Only such products as are not readily subject to self-identification were selected. Handwriting specimens were shown in mirror image, profile photographs were in silhouette form and so on. In each case, the subject was first asked if he could identify any of the items. Cases in which self-identification occurred were treated separately, but in the majority of instances the subjects remained in ignorance that their own photographs or handiwork were among those shown. Nevertheless, their responses to the self-items were reliably different from their responses to the others in the group. These differences can be characterized roughly as follows: The personality descriptions of the self were in general more favorable, and in practically all instances were more emotionally toned. In some cases the descriptions were highly unfavorable but they were rarely or never colorless or indifferent. A word count revealed a reliable difference in favor of the self-descriptions in average length. In spite of this, the self-descriptions more often than the descriptions of others terminated in a verbally expressed blocking, frequently indicated by an expression of irritation, such as, "Bother! I can't tell you any more about this one," or "This handwriting is too pale; I can hardly see it. I don't know what it means."

In Part III, *Personality Diagnosis*, a number of suggestive procedures are described, together with tentative findings from a few experiments. In general, this part of the book is rather less original than the two foregoing sections, and the data have been less completely analyzed. However, a number of fertile areas of investigation are pointed out, along with promising variations of such well-known techniques as the method of free association and the selective factors in the memorizing and forgetting of selected kinds of material.

The book is illustrated by a number of excellent photographic plates. There is a bibliography of 428 titles and a well organized index.

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NOTES AND NEWS

ELEANOR ROWLAND WEMBRIDGE, died on February 20. Dr. Wembridge served as assistant professor of psychology, Mt. Holyoke College (1906–12); as professor of psychology and dean of women, Reed College (1912–17); as referee of the Juvenile Court, Cleveland (1926–36); and as clinical psychologist in California from 1936 to her death.

SOLOMON DAVID EVANS, supervisor of the Worker's Analysis Section of the Chicago Occupation Analysis Unit, Federal Security Agency, died January 7th.

KARL F. HEISER, former director of the laboratory of psychology, Norwich (Conn.) State Hospital, has been appointed director of research, Connecticut Public Welfare Council.

WILBUR S. HULIN has been appointed professor of education at Pacific University, Forest Grove, Oregon.

EMILY M. FLETCHER COOPER has been appointed instructor in psychology, Harcum Junior College, Bryn Mawr, Pa.

HENRY B. MCDANIEL, psychologist and director of vocational guidance for the public schools of San Diego, has been appointed state director of vocational education for California. ANNA CATHERINE MOSER has succeeded Dr. McDANIEL.

C. HART WESTBROOK, who was professor of education and psychology in the University of Shanghai, China, and who received his Ph.D. in educational psychology at Harvard in 1920, returned to the United States on the Gripsholm last December 1, after seven months internment in the Japanese internment camp at Shanghai. Professor Westbrook is resting at Richmond with his family and doing some psychometric work at the Medical College of Virginia.

ESTHER ALLEN GAW, dean of women at Ohio State University, has resigned, effective April 1. In announcing Dean Gaw's resignation from the position which she has held since 1927, President Bevis said "Dean Gaw has rendered long and useful service to the University and she will leave behind her in the system that she has established a fine monument."

PHILIP F. ASHTON, professor of psychology, Houghton (N.Y.) College, has been made dean of the college.

THEODORA M. ABEL has been granted a year's leave of absence from Letchworth Village to work on the problems of adjustment arising among the student body of the Manhattan High School for Women's Garment Trades.

MILTON L. BLUM, instructor of psychology at the College of the City of New York, is on leave of absence to serve as director of a nation-wide survey of war housing for the John B. Pierce Foundation of New York.

HAZEL S. CLAPP, senior psychologist at Grasslands Hospital, has been appointed instructor in psychology at Briarcliff Junior College, Briarcliff Manor, N. Y.

The *American Association for Applied Psychology* in September, 1943, authorized the establishment of a Section of Military Psychology. Officers appointed by the Board of Governors are: *Chairman*, Major T. W. HARRELL, Office of Assistant Chief of Air Staff for Personnel, and *Secretary*, Lieutenant C. GILBERT WRENN, USNR, Bureau of Naval Personnel. The present objectives of the section are: (1) to encourage professional relationships among psychologists in the armed services; (2) to provide for the continued availability

to the armed services of technical advances in psychology both during and following the war period. Up to January 1, 90 members of the association had joined the section out of about 115 eligible for membership. Of this group of 90, 50 are serving in the Army or Army Air Corps, and 40 are in the Navy, the Marine Corps or the Maritime Service.

The family of ALBERT H. MUNSELL, as owners of the Munsell Color Company, which for 22 years has carried on his work in color research, has created a non-profit foundation known as the "Munsell Color Foundation, Inc." The purpose of the Foundation is to "further the scientific advancement of color knowledge, and in particular, knowledge relating to the standardization, nomenclature, and specification of color; and to promote the practical application of these results to the color problems arising in science, art and industry." The first Board of Trustees consists of Deane B. Judd, trustee appointed by the Director of the National Bureau of Standards, elected *president;* Lloyd A. Jones, trustee at large nominated by the Optical Society of America, elected *vice-president;* Blanche R. Bellamy, manager of the Munsell Color Company, Inc., elected *secretary;* Dorothy Nickerson, *trustee* appointed by the Inter-Society Color Council; Alexander E. O. Munsell, *trustee* representing the Donor, and Arthur S. Allen and I. H. Godlove, *trustees at large.* Each member of this board is already well known in color science or in industry.

The Seventh Annual Meeting of the *New York State Association for Applied Psychology* was held at the College of the City of New York on Saturday, February 19, 1944. The morning program centered about "Psychology and the war and post-war problems," and the afternoon program about the "Effect of the proposals of the Intersociety Constitutional Convention upon the New York State Association." DOROTHEA MCCARTHY, *President*, gave an address at a luncheon meeting.

Social Research, the quarterly journal of the Graduate Faculty of Political and Social Science of the New School for Social Research, published in its February issue the first complete translation of a paper on "Gestalt Theory" delivered before the Kant Society in Berlin in 1924 by the late Professor MAX WERTHEIMER. Reprints may be obtained from Social Research, 66 West 12th Street, New York 11, N. Y., at 25 cents per copy.

Correction. Because of the dropping out of a line of copy, an unfortunate error was made in the "Notes and News" section of the February *Bulletin.* The item stating that CHARLES FORDYCE had been made head of the department of psychology at Nebraska Central College, should have read "MARY MACFARLANE DOBSON, formerly assistant to Charles Fordyce has been named head of the department of education and psychology at Nebraska Central College." Professor Fordyce died several years ago.